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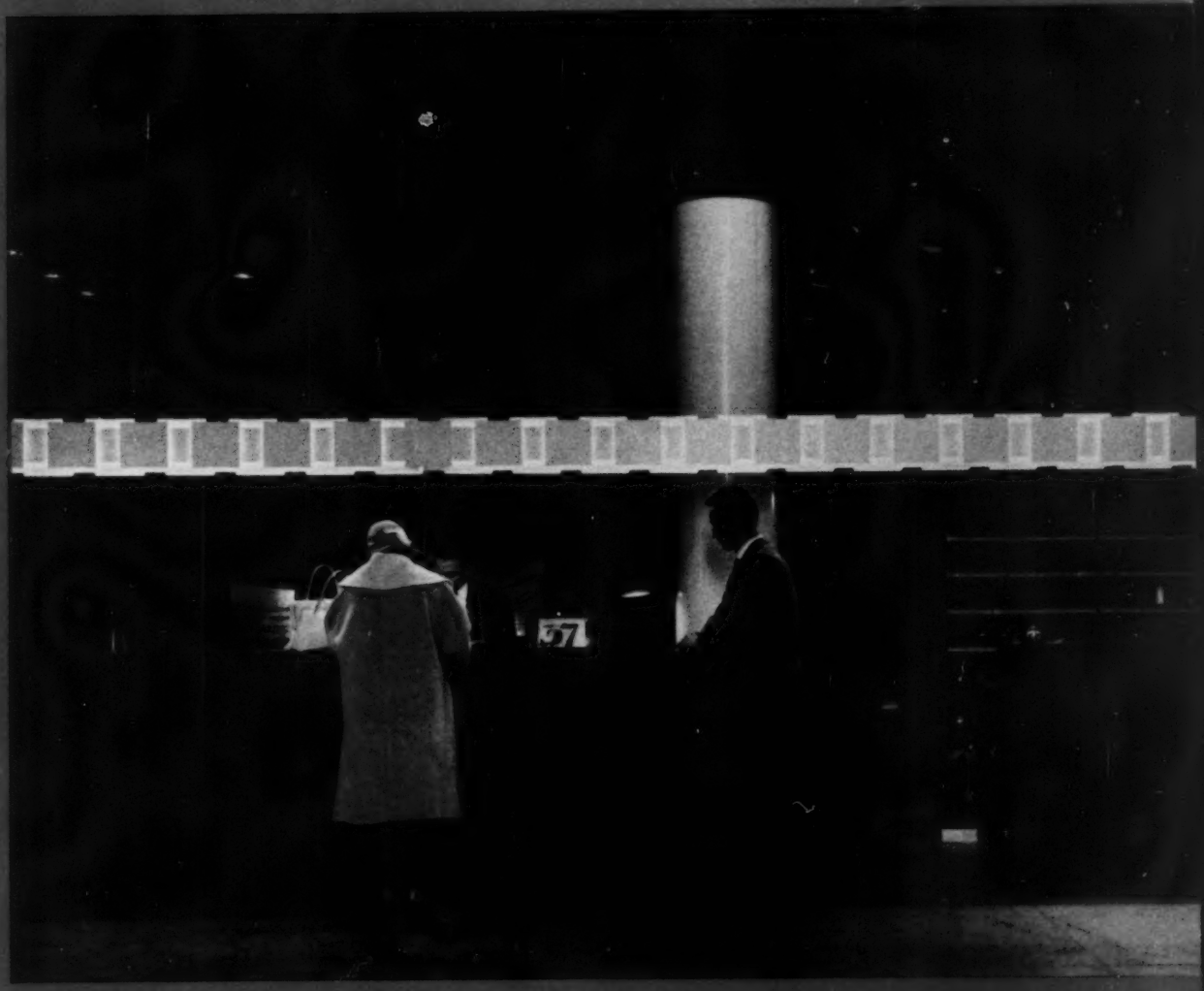
Light and Lighting

March 1961



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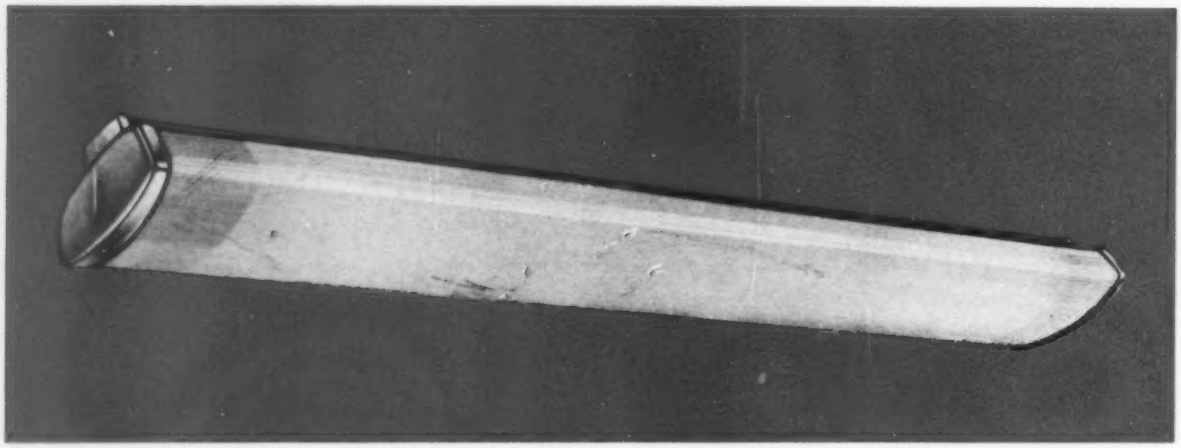

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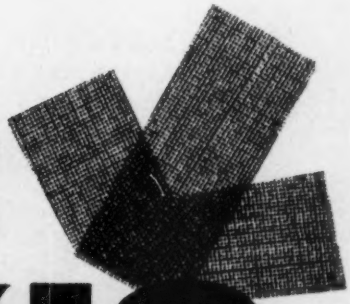

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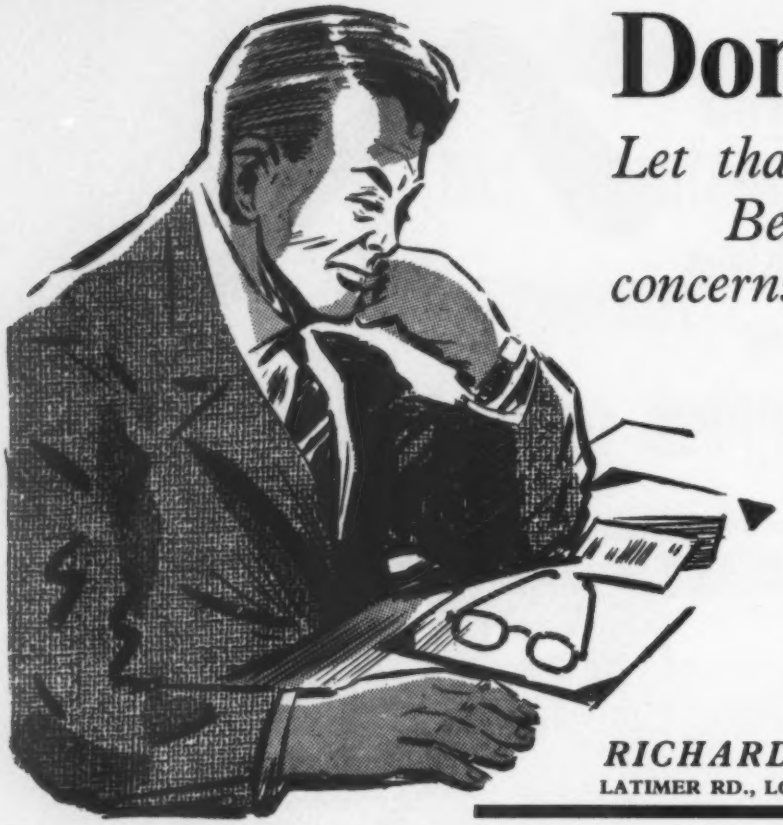

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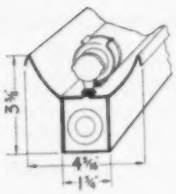

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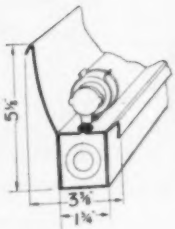

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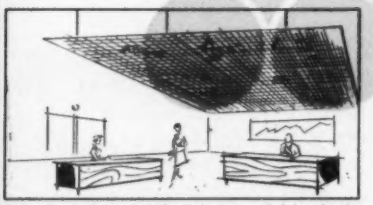

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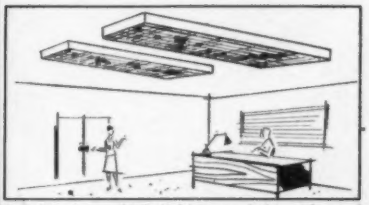

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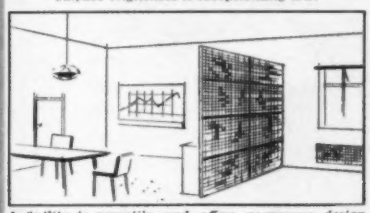

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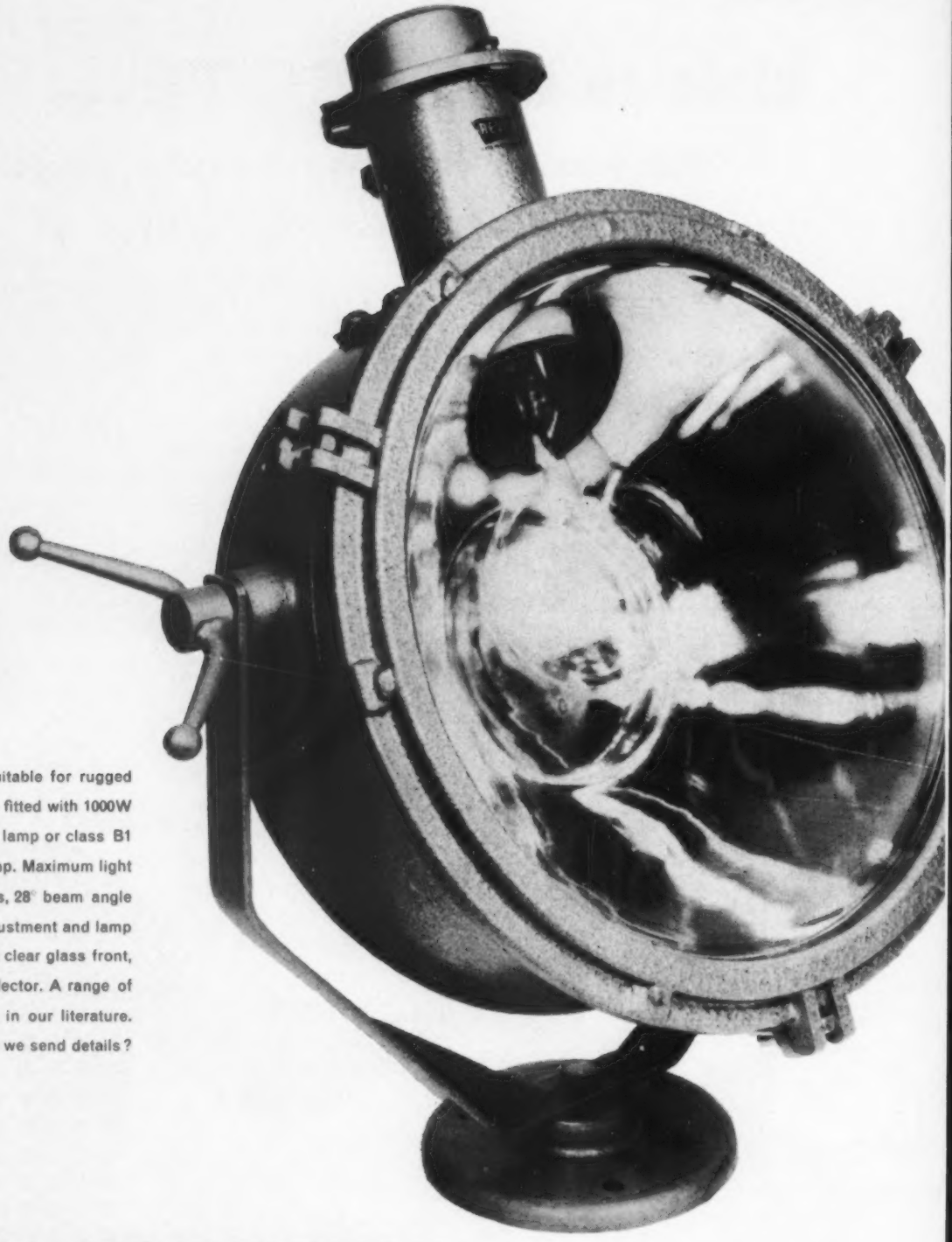

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W & W 67

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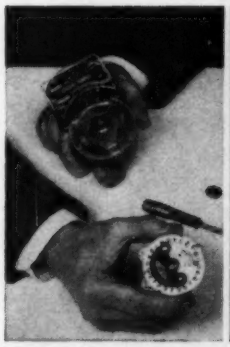

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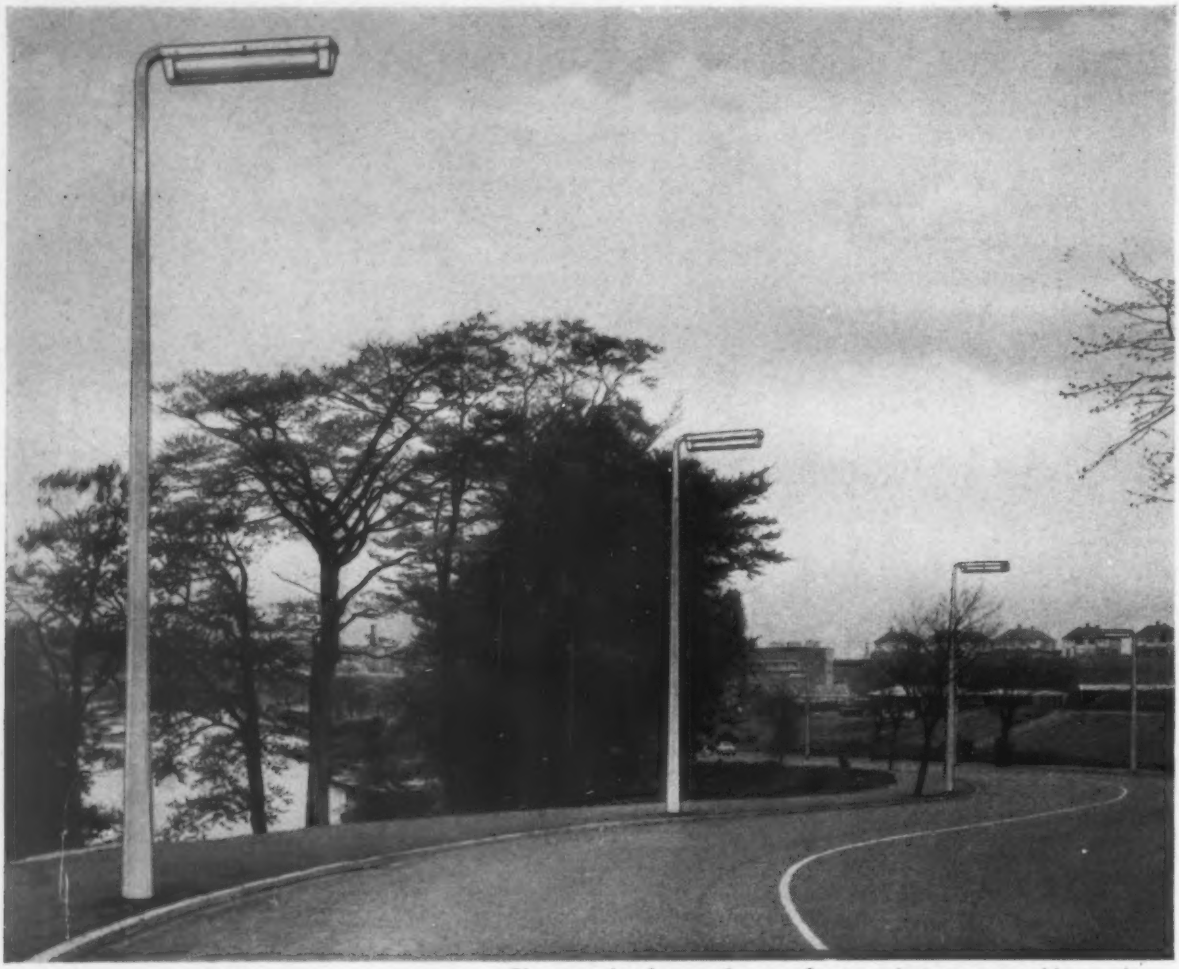

Photograph of one of many Stanton designs acceptable to the Ministry of Transport for use on trunk roads and approved by The Council of Industrial Design.

STANTON

Prestressed Spun Concrete Lighting Columns

Stanton Type 8K Spun Concrete Lighting Columns at Belfast, fitted with Siemens Ediswan 'Corporation' 5-ft. fluorescent lanterns.

Photograph by courtesy of R. Watson, Esq., B.A., B.A.I., M.I.E.E., Belfast City Electrical Engineer.

Spun concrete column under a load of 1,092 lb. showing a deflection of 13½ inches. (The British Standard 1308:1957 proof test load is 320 lb.)

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Lighting installation in Pontefract Rd., Featherstone, Yorkshire. Photographs reproduced by kind permission of Geo. F. Adamson, M.I.MUN.E., Surveyor & Water Engineer, Featherstone U.D.C., Yorkshire.

Made to exacting B.S.I. specifications, these elegant Elecoslim columns are the sure sign of street lighting that's *completely* efficient. Each is fitted with an Eleco lantern, which in turn houses a Philips mercury fluorescent lamp. The bright, clear illumination so obtained ensures visibility of an exceptionally high standard, considerably reducing the risk of accident. Both Eleco and Philips have had many years' successful experience in solving street lighting problems of every kind. These two famous names are your guarantee of efficient performance and complete reliability.

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Lighting installation in Pontefract Rd., Featherstone, Yorkshire. Photographs reproduced by kind permission of Geo. F. Adamson, M.I.MUN.E., Surveyor & Water Engineer, Featherstone U.D.C., Yorkshire.

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Light and Lighting

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Published by the Illuminating Engineering Society at 32 Victoria Street, London, SW1 (ABBey 7553). Printed in England by the Shenval Press, Simson Shand Ltd, London, Hertford & Harlow.

The New Code

The eagerly awaited new version of the IES Code is now available, or will be within a few days of the publication of this issue. The last edition was in 1955; since then lighting technology has made major advances, building practice has undergone considerable change, and standards of industrial efficiency and welfare have risen. In taking cognizance of these developments, particularly of the technical advances in lighting, the Code has changed out of all recognition; it has become an entirely new document, making its predecessor as out of date as yesterday's newspaper. Of all the changes made and new material added, the recommendations for controlling glare represent the largest step forward. To most of us, glare control has always appeared to be a complicated subject to be handled with care, if touched at all. Now, however, lighting engineers are provided with a method for assessing glare which is sufficiently simple to permit its application to most of their work, thus bringing distinctly nearer the ideal of the completely designed lighting installation. Of no less compelling interest, in view of recent American work and its outcome, are the recommendations on illumination; although the Code's compilers carefully examined the American studies, they came to the conclusion that the basis best suited to conditions in this country remains that used in earlier Codes. Nevertheless, the need to achieve maximum productivity and today's higher standards of safety, welfare and of living generally justify some increases in recommended illumination levels and these have been made. Other important recommendations deal with daylighting, permanent artificial lighting and maintenance but there is no space here to comment further. We shall be providing a more comprehensive review in our May issue.

Notes and News

THAT WORKING CONDITIONS IN OFFICES are not what they ought to be seems to be generally accepted, the official expression of the public concern being the Offices Act inspired by Richard Marsh, M.P., which comes into force on January 1, 1962. The Act empowers the Government to introduce regulations laying down minimum requirements for office conditions, including the level of illumination. Just what this level will be, of course, is not yet known, but the most persistent rumour gives it a value of 15 lm/ft², which is the level required by statute in Eire. The current IES Code specifies 20 lm/ft² but the new edition is sure to increase this, probably by 50 per cent. The British Lighting Council would like to see about 50 lm/ft², at least for offices 'where additional mental stimulus is required, or where the public has access and it is desirable to emphasize the commercial efficiency and high standing of the firm concerned', and they voiced these ideas recently in the opening phase of a project to culminate in an 'offices week' in October in which they aim to promote better lighting all round in offices. To give point to their project, they have an exhibition at their Centre in Brettenham House contrasting an 'average' office lighted to about 8 lm/ft² with their ideal. They also have a small section in which the illumination may be increased by the occupier up to about 350 lm/ft²; most of the 'subjects' who have tried it usually find something between 75 and 120 lm/ft² to provide comfortable seeing conditions. The exhibition has been supported by a series of conferences on the subject for architects, contractors and others likely to be involved. With the stimulus provided by the forthcoming regulations, improvements to office lighting will come increasingly to occupy the attention of most of the diverse interests in the industry and the Council is to be congratulated for making such an early start to put the subject in proper focus.

Parliamentary Pre-occupation with Public Lighting

STREET LIGHTING continues to be the greatest concern of parliament when it turns to matters affecting the industry, notably the perplexing problem of glare. That anti-dazzle fence on M1 (which is realized to have as many disadvantages as advantages) has been one recent topic; another is the effect of dazzle from car headlights on accidents. In 1958, it was reported, the police were satisfied that it was a factor in 1,130 accidents involving cars. Mr Hay, the Joint Parliamentary Secretary to the Ministry of Transport, said that the problem was difficult of solution and that any substantial break-through on the technical side still seemed a long way off. Accidents involving street lighting columns also concerned members; it was reported that, during the eighteen months up to December 21 last year, twenty-one concrete columns were knocked down or damaged in accidents on a 5-mile stretch of the Great Cambridge Road leading out of London. This toll led an M.P. to suggest that there was something wrong with their siting. He suggested they should be re-positioned, to avoid obstructing the highway. Mr Hay promised to look into the matter. There was also a call for the suitable lighting of road signs, following a complaint that some of them in the Greater London area were virtually invisible after dark. Mr Marples, the Transport Minister, agreed that some signs were not adequately lit but said that the standard was improving; highway authorities were encouraged to illuminate signs and grants were available for those on classified roads. More recently, the Commons has heard complaints of the shortage of 140w sodium lamps for street lighting, which, it was suggested, arose from the 'concentration of the lamp manufacturing industry' and the President of the Board of Trade was asked to refer the industry to the Monopolies Commission. It had been reported that some local authorities were finding it difficult to obtain these lamps and the position was aggravated by an apparent increase in the number of early failures. Mr Maudling replied that he would investigate any evidence submitted to him when considering possible new references to the Commission.

Lighting and Furniture

THE FURNITURE EXHIBITION has, in the past, usually included a prominent lighting feature but visitors looking for it this year at Earl's Court will have been disappointed. The central feature was a Japanese garden, over which had been suspended nine rows of cylinders housing tungsten lamps. On the other hand, this disappointment was admirably made up for by unusual emphasis on lighting elsewhere in the exhibition. The most pointed reference was on the *Home Magazine* stand where a typical living area and dining area were displayed in a theme of 'Living with Light'. A number of lighting schemes had been built into the stand, these being controlled by an Atlas 'Aurama' soundtrack to show, with commentary, how different types and colours and types of lighting can change the appearance of a given interior. There was also a series of four domestic settings to show how a home could be modified relatively

easily to cater for changes in the family's age and income. The lighting of the four settings certainly showed more originality than the average home although it could not be described as outstanding; it was also interesting to note that fittings used in the original setting tended to recur in the later stages although there was admittedly an improvement in both quality and use paralleling the mythical family's increase in years and wisdom. Not far away, the Council of Industrial Design had four kitchen settings, showing what could be done in town house, small flat, country house and parlour-kitchen.

Modern Photography

THE ROYAL SOCIETY OF ARTS is organizing this month three 'Cantor' lectures on modern photography. They are to be held on three consecutive Mondays—March 6, 13 and 20—at 6 p.m. The subjects are, respectively, 'Photography in industry and commerce' by M. J. Langford; 'Photography in medicine' by C. E. Engel; 'Photography in education' by Miss M. F. Harker. Applications for tickets should be sent to the Society's secretary at John Adam Street, Adelphi, London, WC2.

The Physical Society Exhibition

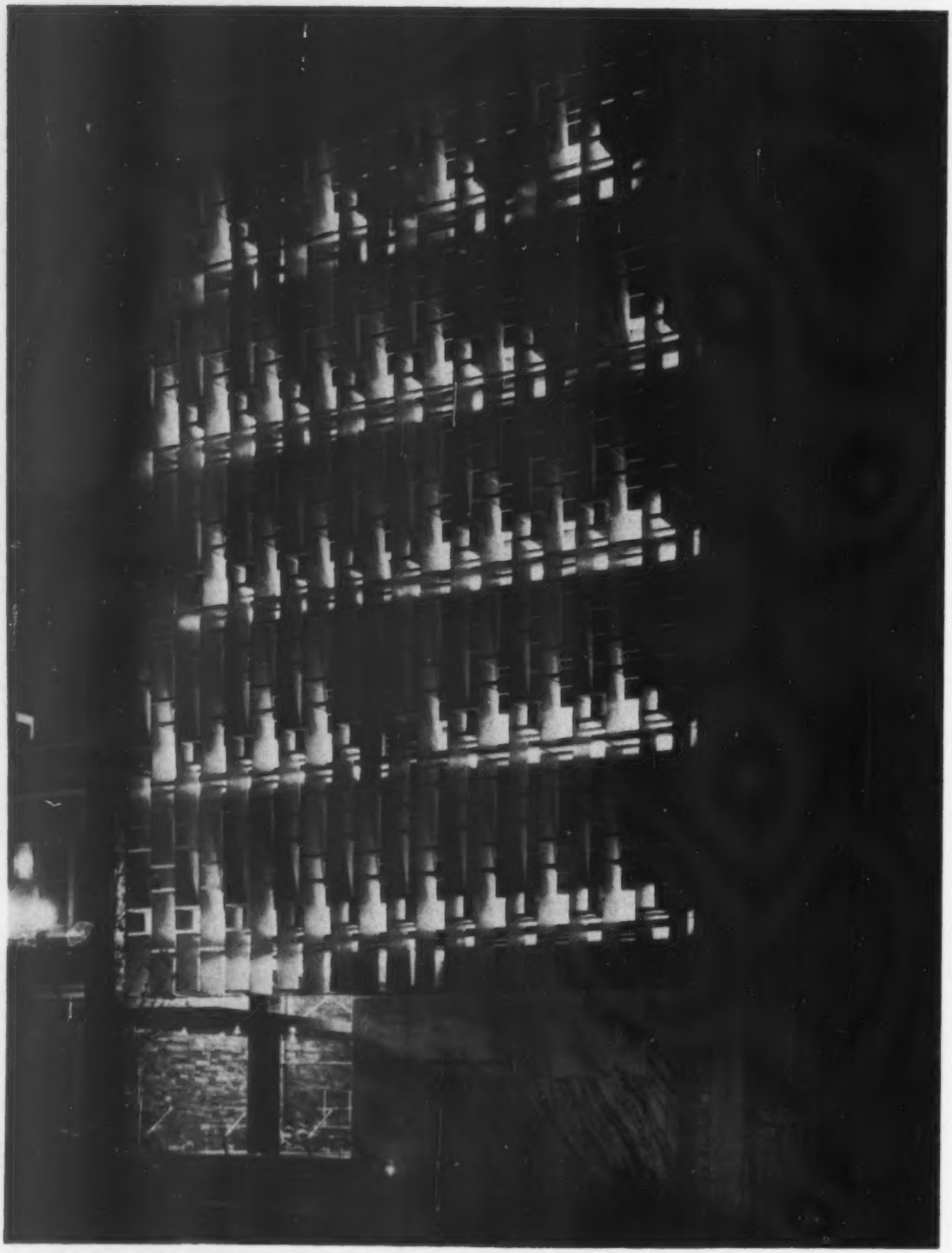
ALTHOUGH THE PHYSICAL SOCIETY has now been amalgamated with the Institute of Physics and the annual exhibition has, in consequence, acquired a new and much extended title, this is so completely unmanageable that without doubt the old title will be used by the many for a long time to come. And, indeed, why not? The exhibition was born and reared, through childhood and adolescence, by the Society alone long before the Institute came into being. This year, with no exhibit from the Colour Group, there was less than ever to interest either the practising lighting engineer or the research worker in the field of lighting.

Among the colorimeters there was one newcomer, the 'EEL Spectra' shown by Evans Electroselenium, while Baldwin Industrial Controls again showed their 'Colormat' for measuring surface colours, as well as a glossmeter and the nephelometer exhibited last year. Tintometer reappeared in the exhibition after a voluntary 'stand-down' last year, and showed the latest version of the Lovibond-Schofield instrument. This has 81 permanent glass filters and by means of a nomograph the readings obtained can be converted to trichromatic co-ordinates on the CIE system. Their display of the colour diagram, built up by the use of Lovibond glasses, was also on view.

The phenomenon of electroluminescence, for so long little more than a fascinating plaything, seems at last to be finding practical application. Thorn Electrical Industries showed some new types of ceramic electroluminescent panels in which the phosphor was embedded in a ceramic material attached to a glass plate having a conducting layer. Ericsson Telephones exhibited two types of panels to which they gave the names 'Phospholite' and 'Phosphotron'. The former were rectangular plates giving green light with a peak emission at 520 mμ and stated to have an efficiency of about 1 lm/w. On a 50 c/s supply the luminance was said to decay to half value in about 10,000 hours of operation. The 'Phosphotrons' were panels with electroluminescent patterns in sections so arranged that by suitable switching any digit or letter could be displayed.

Fluorescent lamps again appeared on several stands. The A.E.I. Lamp and Lighting Co showed lamps with good colour-rendering properties and an experimental sodium lamp which could be dimmed, while A.E.I. (Rugby) Research Laboratories had an interesting exhibit of different types of phosphors. They showed, too, the marked reduction in luminance of fluorescent lamps which occurs on raising the ambient temperature to between 100 and 150°C, particularly noticeable in the lamp giving a greenish light. The Research Laboratories of the General Electric Co showed fluorescent lamps operating from a 26v d.c. supply through an inverter circuit using silicon controlled rectifiers. A number of lamps were connected and it was shown that they could be individually switched, as the voltage was prevented from rising unduly on light load by diodes which 'clipped' the peak of the wave at a pre-determined level. Another interesting development shown by the GEC was a combination of the tungsten-iodine lamp with a mercury-vapour lamp. A fluorescent bulb contained a 250w quartz-tube high-pressure mercury discharge lamp and a 200w quartz-tube tungsten lamp, with iodine additive. The colour of the blended light was good and the efficiency was stated to be about 60 per cent greater than that of a normal tungsten lamp of the same rating, with a life four times as long.

An exhibit shown by the National Physical Laboratory demonstrated, by means of a magnified image of the filament in a tungsten lamp, that while the luminance of the inside of the coil is some 60 per cent higher than that of the outside, the colour temperature is about 50°K lower because of the selective reflection from tungsten at a high temperature. It was shown, too, that the degree of polarization of the light from the filament is not everywhere the same as it depends on the angle of emission from the tungsten surface and is, for example, about 30 per cent at 60° from the normal. Such phenomena as these have to be reckoned with when coiled filament lamps are used as precise standards of luminous intensity or of colour temperature. Another NPL exhibit, described as an absolute radiometer, was clearly of interest as indicating the possibility of eliminating any special standard of light and using, instead, a standard of radiation.



New offices at Melbourne of the National Insurance Co of New Zealand Ltd; the building is faced with a vertical sun break constructed from glass fibre panels which when lit from behind at night present an intriguing pattern of light and shade.

The Carlton Tower

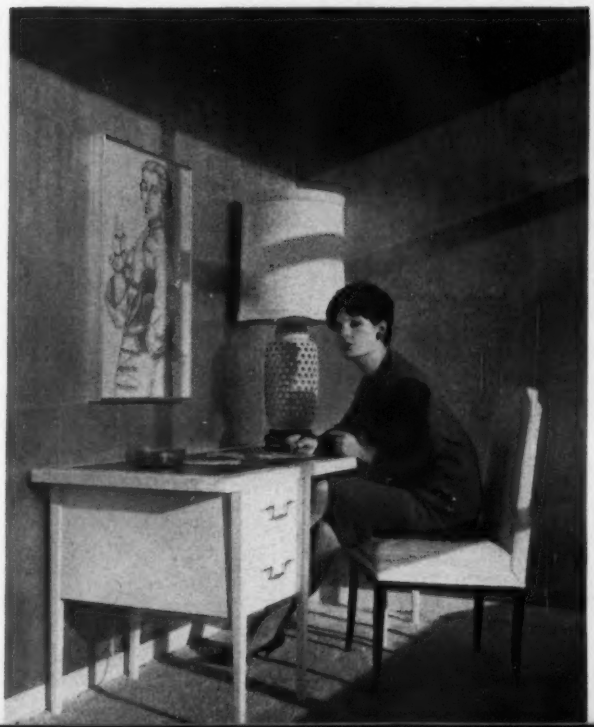
Architect, Michael Rosenauer, FRIBA, AIA;
interior designers, Henry End Associates;
associate designer, Charles Warmouth, AID;
lighting installation, Troughton & Young Ltd;
lighting fittings, excluding table lamps,
Troughton & Young (Lighting) Ltd.

THE CARLTON TOWER is, indeed, a tower, with 17 floors of bedrooms accommodating 450 guests, standing on the corner of Sloane Street and Cadogan Place, with its main entrance in the latter. Built with British capital, the hotel is leased to a British subsidiary of the Hotel Corporation of America and is intended to cater for the luxury trade of expense-account executives, American tourists and others who can afford the room tariff of from £5 a night for a single room to £50 a night for one of the top-floor suites.

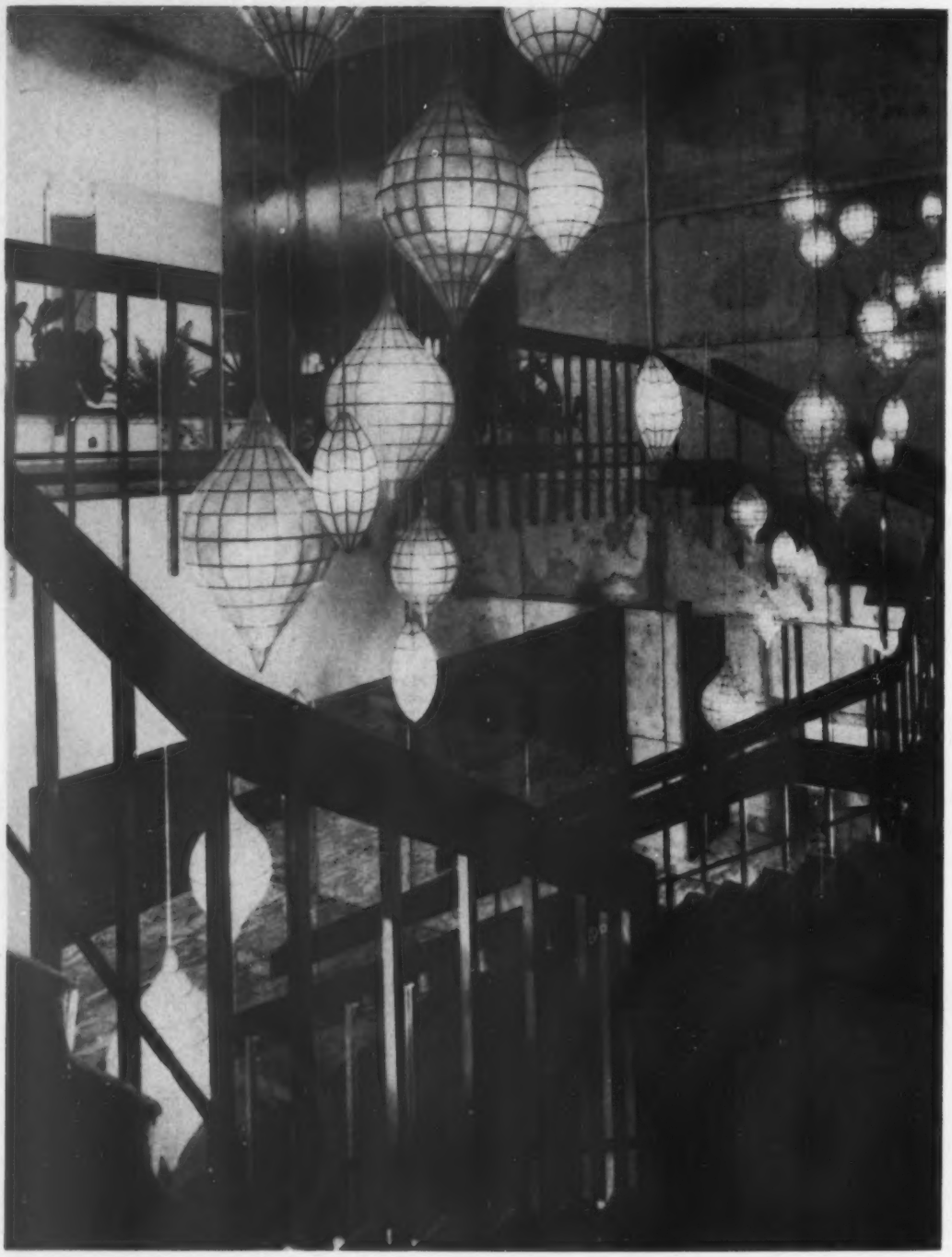
The largest hotel built in London since the war and, indeed, only the sixth to be completed in Great Britain since 1939, the Carlton Tower is planned on similar lines to new luxury hotels elsewhere in Europe, with its ground floor given over mainly to a vast reception hall and most of its public rooms at first-floor level. Also on the ground floor is the Rib Room—a restaurant specializing in the roast beef of Scotland, with a second entrance direct from the street—a newsagent's and a florist's kiosk, and a row of open telephone booths (see page 69). On the first floor, which is reached via a broad staircase that plays a dominant part in the decorative scheme, there is a banquetting hall that can be sub-divided by sliding/folding doors and the main restaurant, while between these rooms there is a lounge-cum-circulation area. Bedrooms are planned to be used also as sitting rooms (many, indeed, have separate sitting rooms *en suite*) and there are no separate lounges for residents only, as were provided in pre-war hotels.

Decor of the Carlton Tower is strictly in the style most commonly found in new hotels in the United States—somewhat theatrical, with a deliberate mixing of modern furniture and items with a strongly traditional flavour. This approach has been criticized—in our opinion, somewhat unjustly, for within the limitations of the chosen idiom the decor is well executed, without fussiness or vulgarity and, while public rooms, it is agreed, are somewhat florid (the designer was, after all, a designer of stage sets for some years), bedrooms and sitting rooms are comparatively austere. Certainly the standard of the interior is vastly superior to that of the architecture generally, the building presenting to Sloane Street and Cadogan Place two of the least distinguished façades of any recently completed building we have seen.

So far as the lighting is concerned, the installation is based on three separate arrangements: general lighting in public rooms is mainly by reflected light from concealed cold-cathode tubing, mostly on dimmer circuits; supplementary lighting in these areas is from spotlights deeply recessed into the ceiling and from decorative wall lights made specially to the interior consultants' designs; while bedrooms and sitting rooms are lit solely by exotic outsize table lamps, with drum-shaped shades of white, gold and pewter parchment (some fabric-covered), which in these rooms, and to a lesser extent in some of the public rooms, are one of the principal features of the decor. (Only single bedrooms have, in addition, a more functional fitting—a fluorescent lamp housed in a white-



At the top of the page, the somewhat stunted tower of the hotel. Left, desk in the £50-a-night luxury suite on the top floor of the tower. When the sun shines, this suite is flooded with light from the continuous windows; at other times it is lit, as are all the guest rooms, solely by outsize table lamps, with exotic bases of brass, marble or gilded plaster.



Above, main staircase from reception hall to first-floor public rooms. Clusters of lanterns of translucent plastics are seen reflected in the wall faced with simulated antique mirror glass. Opposite page: Top, bar in Rib Room restaurant, above which are suspended Danish lighting fittings of polished brass, the rims of which are perforated while the bottoms are open. Centre, open telephone booths at foot of stairs, lit by wall-mounted fluorescent lamps concealed in sheet-steel boxes giving only downward light. Bottom, part of main hall, looking towards reception desk above which there is an area of 'Infinilite' louver panels. Pigeon-holes for mail are lit from behind by light diffused by panels of opal 'Perspex'.

Carlton Tower continued

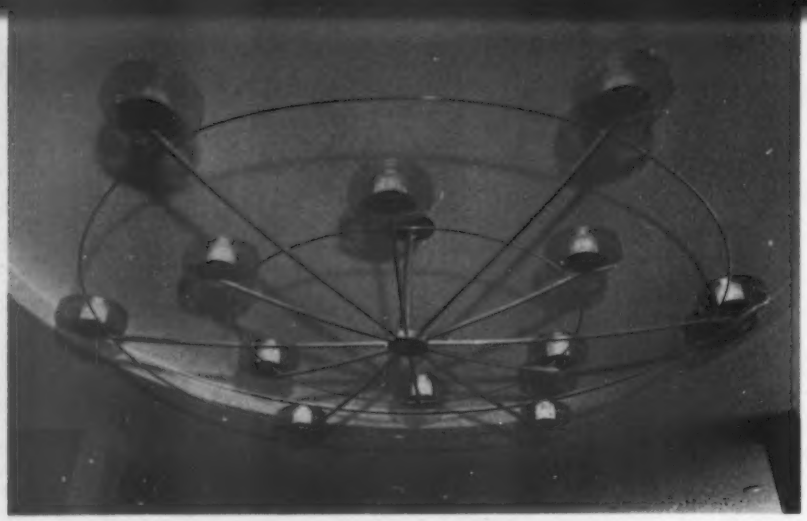
enamelled sheet-steel box open only at the bottom and fixed to the wall over the bedhead.) The bases of the table lamps are made of a variety of materials, including brass, marble and gold- or pewter-finished plaster. They were mostly imported from the United States, though some came from Hong Kong and others were purchased in the United Kingdom.

Corridors are lit by fluorescent lamps concealed above transverse areas of lowered ceiling, with night-cum-secondary-cum-emergency lighting (kept on 24 hours a day) from glass-covered downlights recessed into shallow cupolas in these low areas of ceiling. A gap around each fitting allows for ventilation. Bathrooms are lit by fluorescent lamps fixed to the wall above a full-width mirror over the lavatory basin and concealed from view by a tilted tray of heat-moulded opal 'Perspex' to give diffused downward light and indirect lighting reflected from the ceiling.

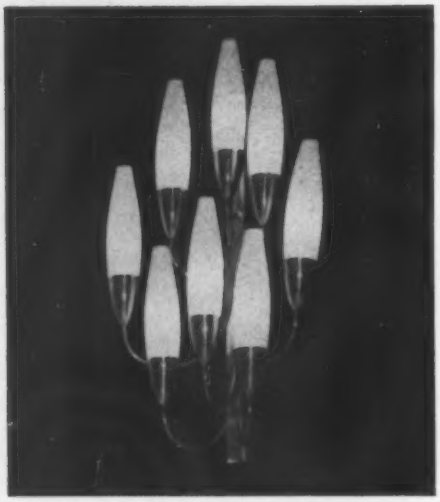
Lifts are lit by fluorescent lamps on the ceiling, covered by honeycomb louver panels of aluminium foil sandwiched between sheets of transparent plastics, while over the lift entrances there are perforated boxes of white-enamelled sheet steel, with soffits of opal 'Perspex', also housing fluorescent lamps.

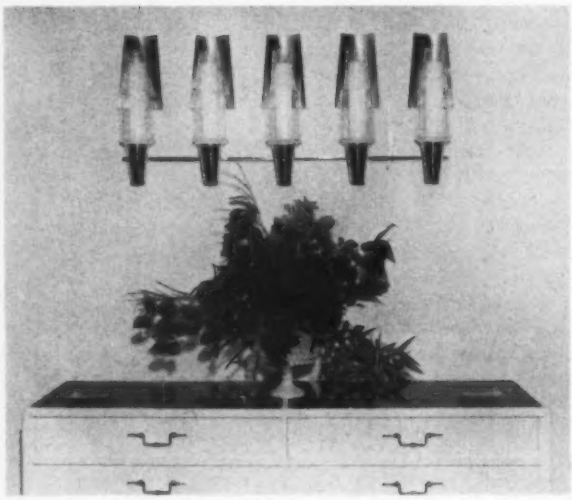
Kiosks in the main hall are lit by fluorescent lamps behind suspended pelmets of perforated brass, while recessed spotlights in this area, as elsewhere, include many fitted with pink filters on the advice of American lighting consultant Bill Richardson. These spotlights, incidentally, include some internally-silvered spotlamps, but are mostly ordinary tungsten lamps with reflectors above focusing the light at a point level with the small aperture at ceiling level, below which the light spreads out in an arc of 45 deg.

Carlton Tower continued



Left, chandelier in cupola in centre of Rib Room restaurant. It is made of polished brass with inner shades of Orrefors crystal and outer shades of clear glass. Below: (1) Wall light in main hall—of polished brass and cluster of opal-glass shades. (2) Wall light in first-floor lounge—polished brass, with inner shades of opal and outer shades of clear glass. (3) Typical corridor, with concealed main lighting and secondary lighting from recessed spotlight. (4) Large table lamps in this view of a sitting room are typical of those used throughout for guest-room lighting.





1 | 2
3 | 4

The Standardization of Daylight Measurements

Data on the availability of daylight at particular localities are becoming increasingly required for a number of purposes. Techniques for measuring daylight are, however, not nearly so well documented as corresponding techniques for measuring the total radiation from the sun and sky. This article, based on a report compiled for the Daylight Sub-Committee of the National Illumination Committee of Great Britain by a panel comprising R. H. Collingbourne (Kew Observatory), P. Petherbridge (Building Research Station) and G. Spurr (Central Electricity Research Laboratories), lists the types of daylight measurement for which some degree of standardization is thought necessary, considers various points of experimental procedure which it is recommended should be adhered to in making the measurements, and gives guidance on the various forms in which the data could be presented.

1. Introduction

DATA ON THE availability of daylight at particular localities are required for such purposes as assessing the size and position of windows in new buildings, estimating the lighting loads likely to be met by electricity generating equipment at different times of the day throughout the year, and correlating plant growth with degree of exposure to the sky. For architectural design purposes in particular, these data are being increasingly required for many different parts of the world, and hence have to relate to a wide range of climatological conditions. Furthermore, as daylighting design techniques become more refined, the associated data need to extend beyond the basic measurement of sky illumination on an unobstructed horizontal plane outdoors.

Whereas measurements of the total radiation from the sun and sky at the earth's surface have been carried out at meteorological stations and elsewhere as a regular routine for a number of years, it is only comparatively recently that any extensive measurements of visible radiation have been made and then only at a limited number of recording stations. Consequently, whereas an extensive knowledge on the measuring techniques employed for total radiation has been accumulated and has found its way in the form of guidance or recommendations into such manuals as the Handbook of Meteorological Instruments,[1] corresponding information on daylight measurement techniques is not by any means so well documented. For example, the Handbook referred to above gives only a brief description of two types of daylight recorder together with general advice concerning allowances that should be made for a number of possible instrumental errors, while the report of the first session of the Commission for Instruments and Methods of Observation of the World Meterological Organization[2] merely recommends a type of photocell to be used for daylight measurements. The IGY Instruction Manual on Radiation Instruments and Measurements[3] on the other hand, offers some valuable advice on the selection of a suitable type of photocell and its associated recorder and on the calibration of the equipment, and is probably the best summary to date of the accumulated experience of such workers as Blackwell[4] and Powell,[5] Dogniaux[6] and Drummond.[7,8]

The Commission Internationale de l'Eclairage (CIE) is interested in the question of daylight measurements, and having prepared a report[9] on the climatological data needed for natural lighting problems, is currently compiling recommendations on the measuring techniques to be used in the recording of such data. For this country, a need has been felt for at least some degree of standardization of daylight measurements, both in the types of measurement that are made and, to a lesser extent, in the instrumental techniques used for obtaining these measurements and in the presentation of the resultant data. The present article is the outcome of studies directed towards securing such standardization; comments on the proposals would be welcomed by the compilers.

2. Types of measurement

In listing the types of daylight measurement for which some degree of standardization would be required it was envisaged that the measurements would be needed for a number of purposes. Although the memorandum is concerned principally with daylighting measurements in this country, the recommendations are generally applicable to any country and hence to any type of climate.

2.1 *Daylight illumination on an unobstructed horizontal surface*

Extensive measurements of the diffuse (sky) illumination on a horizontal surface at Teddington have been made and published.[10] In addition, continuous recordings of total (sun and sky) illumination on a horizontal surface are being made by the Meteorological Office at Kew, London (Kingsway), Eskdalemuir, and Lerwick [some of the data for Kew have already been analysed and reported in a Meteorological Research Publication[4]], while the Central Electricity Generating Board has remote-indicating daylight recorders making similar measurements at Newcastle, Manchester, Leeds, Birmingham and in the London area.

The CIE definition of Daylight Factor specifically excludes direct sunlight from the outdoor (and indoor) illumination levels. For daylighting design purposes in which daylight factors are used, measurements of diffuse (sky) illumination are therefore required. For this country, and particularly for south-eastern England, the

requirement has so far been met by the Teddington measurements. These measurements have also been extensively used in assessing durations of artificial lighting.

On the other hand, the Central Electricity Generating Board assesses amounts of artificial lighting (and thus predicts electricity demands) from measurements of total (sun and sky) illumination. Until more information becomes available on the climatological factors which determine the switching on and off of artificial lighting, it cannot be said with certainty whether diffuse or total illumination measurements are best suited for assessing artificial lighting durations. In any case, the measurements made by the Meteorological Office and by the Central Electricity Generating Board provide a valuable indication of the *total* amount of daylight present at any one time.

There would therefore seem to be a case for measurements of both diffuse (sky) and total (sun and sky) illuminations on a horizontal plane at each recording location [such a recommendation is in fact made by the CIE].[9] In reporting these measurements, a clear distinction between the types of illumination which have been recorded should in every case be made. This would eliminate the possibility of diffuse illumination measurements for one locality being related with total illumination measurements for another locality (as, say, between Teddington and Kew).

2.2 *Daylight illumination on vertical surfaces*

The recommendation of the CIE[9] on this point stems from American practice where skies other than the densely overcast are frequently considered for design purposes, and where, therefore, the illumination from the sky on the vertical plane of the window is used as additional information to specify the photometric characteristics of the prevailing sky. For design purposes in this country, where a densely overcast sky of known luminance distribution is usually assumed, the vertical surface illumination can be deduced from the corresponding horizontal surface illumination (by multiplying by a factor of 0·4). For other luminance distributions it is recommended that the vertical surface illuminations be calculated from the distributions themselves as required.

No recommendations on the measurement of vertical surface illumination are therefore made in the present article.

2.3 *Direct solar illumination*

Published measurements[11] for the illumination from the sun normal to the sun's rays are limited to one time of day, and then only to days when the sun cast intense shadows. These measurements could therefore be usefully supplemented with continuous recordings, but at a lower priority to 2.1 above.

2.4 *Luminous efficiency*

Data on the luminous efficiency of natural daylight are needed for those localities where daylight illumination data may be required but where radiation recordings alone are presently available. For this country, luminous efficiencies have been determined at Kew[4] and rough correlations have been obtained of their variability with time of year and with water vapour content of the atmosphere.

2.5 *Sky luminance distribution*

Daylight design for other than densely overcast sky conditions requires a knowledge of the many and varied sky luminance distributions associated with these other sky conditions. For this country, only 'spot' measurements of sky luminance distributions so far exist and these not in a conveniently documented form. A particular need is for information on the average distributions associated with representative types of cloud cover intermediate between the densely overcast and the clear blue.

2.6 *Spectral distribution*

Data on the spectral distributions of sun and sky radiation are required for the simulation of artificial daylight sources for colour matching and fading (accelerated weathering) purposes, and for determining the effects of selective reflection, absorption and/or transmission of materials on the visible/invisible components of the incident natural radiation. Measurements for this country of such spectral distributions (including the ultra-violet and infra-red) are needed to supplement the relatively sparse amount of data presently available from other countries.

2.7 *Associated climatological data*

Appropriate recordings should be made so that all of the measurements indicated above can, if required, be correlated with cloud coverage (type, amount, height of cloud base and thickness), duration of sunshine and sun position (particularly solar altitude). This is especially important in the case of sky luminance distributions where much of the value of the recordings is lost if the associated climatological data have not been obtained.

3. Techniques for measurement

The following points of experimental procedure should be adhered to in making the measurements listed in section 2 above.

(*a*) All photocells should approach as closely as possible to a colour response conforming with the CIE luminosity function (the CIE 'human eye' response). In every case it is advisable that first publication of recordings made at a particular locality, or in a particular measuring network, should give information on the response curve for the light receptor(s) being used.

(*b*) For measurements of illumination all light receptors should approach as closely as possible to a perfect 'cosine' response. Information on the actual cosine response, including the effect on this response of any glass protective dome, should be included in first publication of the recordings.

(*c*) Where the outputs of photocells are sensitive to temperature changes precautions should be taken to reduce these changes to a minimum either by thermostatic control or at least by adequate thermal insulation. The illumination on the photocell proper should be kept as low as possible to minimize heating up of the photocell due to the accompanying radiant heat.

(*d*) Where the outputs of photocells are sensitive to humidity changes the photocells should be operated in hermetically-sealed instrument cases incorporating replaceable drying agents. Ideally, sealed or 'potted' photocells should be used.

(*e*) Regular calibrations of the measuring equipment should be made to ensure that the equipment remains within 5 per cent of its indicated values throughout the operating range. The frequency of calibration will need to be determined from experience of the time interval for the equipment to change significantly from its calibration values An *in situ* calibration check at daily intervals with a portable photometric device, which is itself calibrated weekly in the laboratory, is a possible suggestion.

CIE Standard Illuminant C (6,700°K) should preferably be used for the colour temperature of the standardizing source for all instruments measuring sky illumination and luminance, and Standard Illuminant B (4,800°K) for all instruments measuring direct solar illumination. The importance of using these Standard Illuminants, rather than an incandescent filament source alone, depends very much on the accuracy with which the photocells are colour-corrected to normal eye response.

(*f*) For measurements of diffuse illumination a shading device will be necessary. A shade disc, rotating in an appropriate orbit, is preferable to a shade ring, pre-set at daily or weekly intervals, since with the clearer sky conditions a ring obscures from the light receptor much more of the brighter parts of the sky. The correction, if any, which has been made to the observations to allow for the presence of the disc or ring should be clearly indicated in first publication of the measurements.

(*g*) The masking tube for the light receptor used for measuring direct solar illumination should have a similar acceptance angle (approx. 10°) to that normally used when measuring direct solar radiation. The masking tube for the light receptor used for measuring sky luminance distributions should also have a similar acceptance angle.

(*h*) Consideration should be given to the development of measuring equipment

whereby luminous efficiencies can be directly recorded, rather than by determining quotients of separate illumination and radiation measurements as at present. Consideration should also be given to the development of measuring equipment for sky luminance distributions, in which either a directional photocell automatically scans specific areas of the sky vault at pre-determined intervals, or in which a photographic record of the sky vault is made at pre-determined intervals and is subsequently interpreted under closely controlled conditions by means of a photo-electric micro-densitometer.

(*i*) Consideration should be given to present-day techniques for data recording (e.g. punched tape) and for data analysis (e.g. Hollerith punched cards). Where data are to be presented in the form of averages (of illumination) over hourly intervals then consideration should be given to the automatic integration of the illuminations over these periods. The method of averaging (automatic integration, visual estimation from recorder charts, etc.) should be indicated in first publication of the measurements.

4. Presentation of data

(*a*) All illumination measurements should be made in lux or kilolux. Where integrations of the illumination are made over hourly periods, the measurements should be made in lux-hours or kilolux-hours. When publishing the data, the choice between metric units and non-metric units (i.e. lumens per sq. ft. (footcandles) and footcandle-hours) will depend on the expected use to be made of the data.

(*b*) The present procedure whereby illumination measurements are reported as averages of hourly periods (local apparent time) for different months of the year should be continued. Information on the frequency distributions of the individual values comprising these averages, expressed statistically, should be reported as it becomes available. The recording of data on, for example, punched tape, should enable a much finer break-down, as for each week of the year, to be obtained if required.

(*c*) An alternative form for reporting illumination measurements which is valuable when determining durations of artificial lighting, is the number of days in the year (or in a given month) when the illumination falls below specific levels (e.g. 100, 250, 500 and 1,000 lm/ft^2) at each hour of the day.

(*d*) There is some value for daylight prediction purposes in being able to predetermine the illumination (total or diffuse, or direct solar) in relation to solar altitude for given sky conditions. Consideration should therefore be given to correlating illumination data with solar altitude in this way.

(*e*) Luminous efficiencies (expressed in lumens per watt) should be correlated with time of year, solar altitude, cloud cover, and water vapour content, etc., and values quoted both for overall means and for means related to specific types of sky, together with associated tolerances.

(*f*) Sky luminance distributions, expressed relative to the zenith luminance, should be reported for densely overcast and clear blue skies and for a limited number (say three) of intermediate types of sky, possibly identified by their associated luminance distributions, as well as by their subjective appearances. Data on the frequencies of occurrence of each of the luminance distributions should also be reported, preferably with some indication of the associated horizontal surface illumination levels (total and diffuse). Luminances should be expressed in candelas per sq. metre (nits) or foot-lamberts, as appropriate.

Consideration should be given to the adoption of the stereographic projection of the sky vault for plotting sky luminance data. This projection has the dual advantage that sun paths simply plot as the arcs of circles, and that the horizon (which is the most important part of the sky as far as side windows are concerned) is expanded relative to the zenith (unlike the orthographic projection where the horizon is contracted relative to the zenith).

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[11] Illumination Research Technical Paper No. 17, H.M.S.O. (1935).

Chelsea Pensioners' New Infirmary

TWENTY YEARS AFTER the destruction of the original by bombing, the 400 Chelsea pensioners again have an infirmary at their Royal Hospital. Opened last month by Queen Elizabeth, the Queen Mother, the new building has been built by the Ministry of Works for the War Office at a cost of £200,000.

The infirmary is an L-shaped building, with a two-storey ward block facing south and a three-storey wing for out-patients, various hospital departments and staff. The ward block provides space for 72 beds in four wards of 18 beds each; there are also eight single rooms for patients and for nursing services.

In general, lighting throughout the infirmary is by tungsten filament lamps making use of manufacturers' standard ranges. The ward lighting employs Falks 'Orion' fittings; they comprise an outer metal reflector which is an inverted frustram of a cone with a smaller concentric reflector of similar shape below and a further cone above which supports the cord and lamps. Each fitting houses two lamps: one of 150w for general lighting; the other of 15w for night-time use. Bed-head lighting is by adjustable wall brackets with 60 pearl lamps. For the day spaces, another Falks decorative fitting is used, comprising a shallow metal dome painted red, with an enclosure of opal glass through the centre of which projects a deep brass bezel-reflector also enclosed by opal glass. The general effect in the wards is of lighting blending unobtrusively in a decor of egg-shell finish wall coatings, comprising royal blue panels on a light grey background.

In the treatment areas, the lighting is severely functional, using opal glass spheres except in the handicrafts room, where reflector fluorescent fittings are used. In utility areas, the MOW standard for such areas has been adopted—clear well-glass fittings, fitted with 100 or 140w g.l.s. lamps; as the kitchen is, somewhat surprisingly, classified as a utility area, work here has to be carried out under conditions of what must be particularly uncomfortable glare. Fortunately, the staff rooms have had more sympathetic treatment; AEI 'Satina' fittings have been used, whose simple elegant lines and gentle colour tints are not out of keeping in an interior domestic in scale, if not particularly homely in atmosphere.

Design, Chief Architect's Division, Ministry of Works; main contractor, Sir Lindsay Parkinson and Co Ltd; electrical installation, Iveson Electrical Ltd.

TWO SHOPS

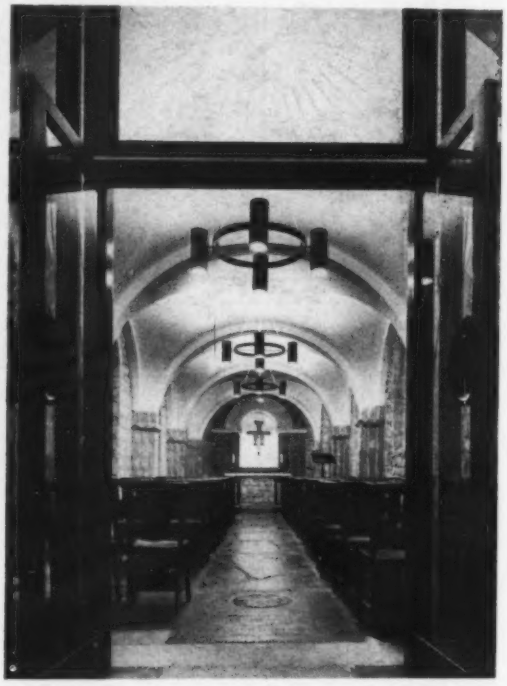
Chique, Kingsway

THIS SHOP for ladies' lingerie and knitwear in Kingsway, London, W.C.2, was designed by Norman Battershill, MSIA. Its all-glass shopfront is contained within the eliptical arch of the office building in which it is situated, and this arch is echoed by an unusual feature of the interior—a luminous ceiling of barrel-vault section. Decor of the shop interior is in lilac, gold, black and white; woodwork is of mahogany; the counter front of pvc-coated fabric; while the end wall is covered by a mural executed by the designer. The aim of the luminous barrel-vault is said to be that it gives a feeling of spaciousness in a rather narrow shop, and the end walls above the springing of the vault are faced with mirror glass to further increase the illusion of space. Displays and the mural are lit by Atlas 'Super Slim' fluorescent units concealed behind black-painted suspended pelmets; cylindrical glass fittings from GEC hang over the counter; while brass-rimmed spotlights from Lumitron are recessed into the ceiling at the rear of the premises. The 'Lumitane' ceiling is supported by aluminium ribs and lit by 34 5-ft fluorescent lamps. Shopfitting, completed in less than four weeks, was by Decor and Display; electrical installation by Trade Contractors Ltd.

Richard Adam, Strand

THIS NEW branch of a men's outfitters with four other shops in the Greater London area occupies part of the ground floor and basement of Villiers House, a recently completed office building in the Strand. It stands on the corner of an arcade and along this frontage the designer Jeremy Lubbock has arranged four all-glass freestanding showcases. Another, similar showcase occupies part of the Strand frontage (*above*) and, with both façades of the shop entirely of glass, passers-by have an excellent view of the shop's well-designed interior, with its murals by Arthur Ferrier. For this reason, incidentally, the sale of goods that have to be tried on is restricted to the basement area (*below left*). The main feature of the interior is a freestanding staircase, with afrormosia treads supported on a welded-steel spine, at the base of which there is an ornamental pool and fountain. Suspended ceilings throughout provide concealment for fluorescent lamps that flood all vertical surfaces with light, while additional lighting comes from spotlamps recessed deeply into these ceilings and from decorative tungsten fittings, with cylindrical shades of perforated stainless steel, suspended over the long counter of the ground floor (*below right*), and the shorter counter at the rear of the basement area. Self-selection storage units in the basement have lighting below floor level shining on to white walls against which the clothes are seen partly in silhouette, while extra light is provided by fluorescent lamps concealed from view by fascias of matt black-painted steel suspended from the ceiling. Show cases have illuminated soffits of 'Paragrid Tile', while their opal 'Perspex' fascias, on which the name of the firm is painted are lit from the same source. (Shopfitting by A. Davies & Co. (Shopfitters) Ltd.)

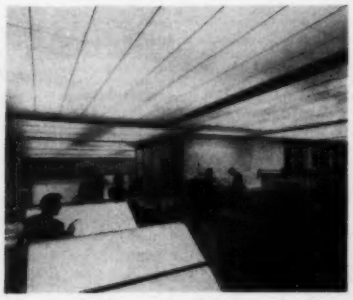
LIGHTING INSTALLATIONS



A church requires lighting which enhances its dignity and these two illustrations show how the effect may be achieved in both modern and historic interiors. Above is St Peter's, Hinckley, where general artificial lighting is provided unobtrusively from 4 ft fluorescent fittings mounted round the window reveals. (Architect: Brown and Sharpe; electrical contractors: Brocklehurst and Ginns Ltd; lighting: Atlas Lighting Ltd.) The picture on the right is of the crypt chapel of St Mary-le-Bow, which has recently been restored. Each cylinder on the pendants houses a 100w lamp for downward lighting and a 60w lamp to light the ceiling. (Architect: Laurence King; lighting: Atlas Lighting Ltd.)

Birmingham's Chamber of Commerce has recently moved from the city centre to an elegant new building in Edgbaston; it occupies the four-storey block (see right) and part of the adjacent eight-storey block. In general, artificial lighting throughout is fluorescent, diffused in distribution, with an illumination level from 30 to 35 lm/ft². The views below are of the council chamber and part of the library, where specially designed, 4 ft square semi-recessed fittings are used, housing six or four warm-white lamps; similar fittings are used in the committee rooms. They employ shallow opal 'Perspex' diffuser panels set in a slim matt-black metal surround pierced with star-shaped apertures. The panel is set about 2 in. below the ceiling surface to ensure that a certain amount of light falls on to the ceiling. Offices generally are lighted by means of standard 6 ft by 2 ft recessed module fittings housing four warm-white lamps of either 5 ft or 4 ft size, whilst corridors are provided with '101' series twin-tube fittings having blue-grey finished frames and special sheet-glass diffuser panels. (Architect: John H. D. Madin; main contractors: Tersons Ltd; electrical contractors: Parker, Winder and Achurch Ltd; lighting: General Electric Co. Ltd.)

Luminous ceilings seem more and more subject to the incorporation of decoration to break up their rather flat appearance. A recent example is an area of ceiling in the new Northfield Service Centre of the Midlands Electricity Board; as shown right, the ceiling utilizes translucent panels of special design. Lighting by means of 8 ft 125w lamps concealed above gives a level of illumination of 100 to 125 lm/ft². By way of contrast, the adjacent window soffit incorporates high-brightness sources for 'sparkle', comprising a combination of 150w g.l.s. lamps and 85w fluorescent-bulb mercury lamps. A more striking contrast is to be seen in the demonstration room where, as shown below, a combination of 2 ft square recessed fluorescent panels and semi-recessed tungsten spotlamps has been used, giving an illumination of 75 lm/ft². (Architects: Leonard J. Multon and Partners in association with A. G. Sheppard Fidler, Birmingham City Architect; lighting: Courtney, Pope (Electrical) Ltd in association with the MEB.)



Another example of the way luminous ceilings may be 'decorated' is shown above left in the boardroom of the Midlands Employers Mutual Association at their new headquarters in Birmingham. The luminous area consists of 84 'Circlgrid-Tiles' divided into two panels by a pierced metal trough which effectively breaks up the ceiling area although its use was also dictated by the presence above the division of a structural beam. Lighting is provided by 4 ft white lamps to an illumination of 35 lm/ft². (Architects: S. N. Cooke and Partners; illuminating engineer: G. F. H. Satchwell; electrical contractors; Harris and Sheldon (Electrical Contracting) Ltd.) The companion illustration again comes from Birmingham, showing a drawing office of the Central Electricity Generating Board. The ceiling, having a luminous area of 5,000 ft², is made up of 3,225 'Paragrid-Tiles', with 5 ft and 4 ft tubes above, to give virtually shadowless illumination of about 40 lm/ft². Louvered tiles were used in preference to flat pans to give a lower ceiling brightness without affecting the intensity of illumination and to reduce the frequency of maintenance. (Design: Midlands Project Group, CEGB; contractors: Draftsele; lighting: Harris and Sheldon (Electrical) Ltd.)

The recently reconstructed paint and wallpaper showrooms of John Line employ approximately 150 'Forrest Modern' glassware lighting fittings, chosen for their combination of simplicity and ability to emphasize ceiling height. They were specially made with a brass backplate and appropriately finished supporting steel tubes to match the surrounding décor. More than seventy of these fittings were used in the staircase block, shown right, which extends through three floors in the centre of the showrooms. (Designers: J. Dalling and Partners in co-operation with John Line and Sons Ltd; lighting: Atlas Lighting Ltd.)

Calculations for linear light sources

Practical comparisons of the aspect factor and sector flux methods

By R. R. HOLMES, M.Sc.

READERS WILL BE FAMILIAR with the sector flux method of calculation from earlier articles[1,2,3,4] in these pages. Another method, mentioned in the recent lectures on advanced lighting techniques at the Northampton College, London, is the aspect factor method, details of which appeared about eighteen months ago.[5] Although both methods have now been in use for some years, it may be of interest to give a brief account of the latter, and lesser-known system and a comparison with results from the sector flux method for a few common lighting problems.

Basis of aspect factor method

The illumination on any plane parallel to a linear source (or row of closely-spaced linear sources), as in fig. 1, can be shown to be:

$$Ep = \frac{n \times I_\theta}{l \times h} \times \cos\theta \times \cos\phi (AF) \quad \ldots\ldots (1)$$

while the illumination on a plane perpendicular to the source axis, as in fig. 2, will be:

$$E_e = \frac{n \times I_\theta}{l \times h} \times \cos\theta \times (af) \quad \ldots\ldots\ldots (2)$$

where

n = number of units of which the row is composed
I_θ = transverse intensity of one unit in the plane of incident light
θ = angle made by the plane of incident light with the downward vertical
l = length of the whole source or row
h = height of source above horizontal plane through the point of interest
ϕ = angle made by the normal to the surface at the point of interest with the plane of incident light
AF = aspect factor term for planes parallel to the source axis
af = aspect factor term for planes perpendicular to the source axis

The values of these two terms are given in tables published earlier[5] (of which only an extract is given here*) and express the summed effect of each infinitesimal element of the source in providing illumination at the point of interest.

The aspect factor is found by subtracting the value from the table corresponding to α_1, the aspect angle to the near end of the source from that in the table corresponding to α_2 the aspect angle to the far end of the source. These angles can be found graphically or from

$$\tan\alpha_1 = \frac{d_1' \cos\theta}{h} \text{ and } \tan\alpha_2 = \frac{d_2' \cos\theta}{h}$$

where d_1' and d_2' are distances as indicated in figs. 1 and 2. Thus, apart from this one subtraction, the operation can conveniently be handled on a slide-rule.

Classification of sources by axial distribution

The columns in the table give values for sources with cosine (diffusing) and cosine-squared (louvered) types of axial distribution, and also for an arithmetic mean (intermediate); figs. 3 and 4 show how closely the axial polar curves of practical lighting units approach these theoretical curves. Wherever α is between 0° and 50°

* The original article[5] includes two tables, giving both parallel-plane and perpendicular-plane aspect factors, for aspect angles from 0° to 90° in half-degree steps; the extracts from the table of parallel-plane aspect factors show only small sections including those values referred to in the practical examples given later. Complete tables may be obtained from the author.

Parallel-plane aspect factors

Aspect angle α – degrees	Fitting classification					
	Diffusing $\frac{1}{2}(\sin\alpha\cos\alpha+\alpha)$		Intermediate (mean)		Louvered $(\sin\alpha - \frac{1}{3}\sin^3\alpha)$	
.	.		.		.	
.	.		.		.	
16	0·272	0·280	0·270	0·278	0·269	0·276
17	0·288	0·296	0·286	0·293	0·284	0·291
18	0·304	0·312	0·301	0·308	0·299	0·306
19	0·320	0·328	0·316	0·324	0·314	0·321
20	0·335	0·343	0·332	·0339	0·329	0·336
21	0·351	0·359	0·347	0·354	0·343	0·350
22	0·366	0·373	0·361	0·368	0·357	0·364
23	0·380	0·388	0·375	0·382	0·371	0·378
24	0·396	0·403	0·390	0·397	0·385	0·392
25	0·410	0·417	0·404	0·411	0·398	0·404

Aspect angle α – degrees	Fitting classification					
	Diffusing $\frac{1}{2}(\sin\alpha\cos\alpha+\alpha)$		Intermediate (mean)		Louvered $(\sin\alpha - \frac{1}{3}\sin^3\alpha)$	
26	0·424	0·431	0·417	0·423	0·410	0·416
27	0·438	0·445	0·430	0·436	0·423	0·429
28	0·452	0·459	0·443	0·449	0·435	0·441
29	0·465	0·471	0·456	0·462	0·447	0·452
30	0·478	0·484	0·473	0·479	0·458	0·463
.	.		.		.	
.	.		.		.	
51	0·690	0·693	0·655	0·658	0·621	0·623
52	0·697	0·700	0·661	0·663	0·625	0·627
53	0·703		0·666		0·629	
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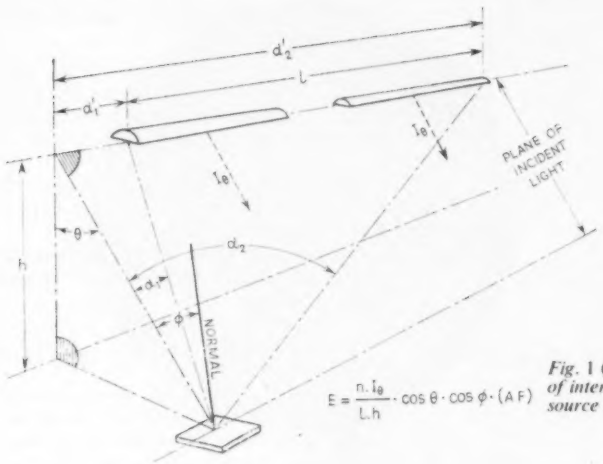

Fig. 1 (left). Case for a plane of interest parallel to the source axis.

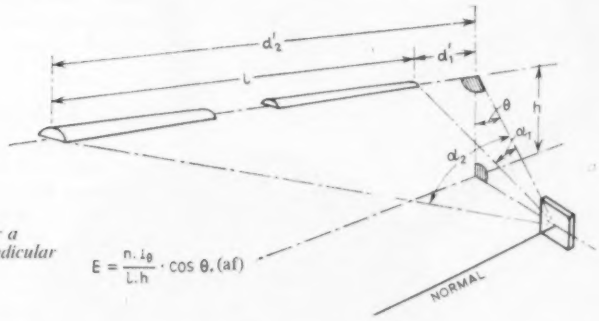

Fig. 2 (right). Case for a plane of interest perpendicular to the source axis.

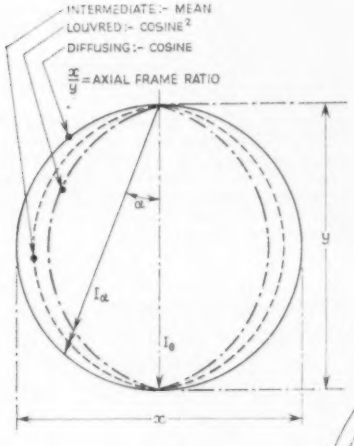

Fig. 3 (left). Ideal axial polar curves.

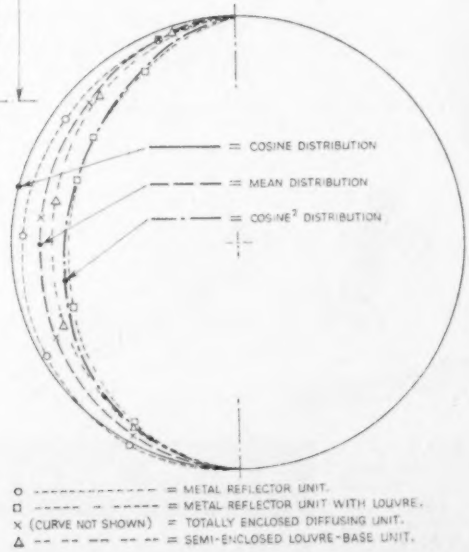
= COSINE DISTRIBUTION
= MEAN DISTRIBUTION
= COSINE² DISTRIBUTION
o ---------- = METAL REFLECTOR UNIT.
□ ----- - ----- = METAL REFLECTOR UNIT WITH LOUVRE.
x (CURVE NOT SHOWN) = TOTALLY ENCLOSED DIFFUSING UNIT.
Δ -- -- -- -- -- = SEMI-ENCLOSED LOUVRE-BASE UNIT.

Fig. 4 (right). Practical axial polar curves.

a quick classification is given by noting the ratio $x : y$ in fig. 3, i.e. the width to height of the polar curve: if the value is above 0·925 the classification is diffusing, if below 0·825 it is louvered and for values between it is intermediate. For cases where the direction of the main contribution of light exceeds 50° from the downward vertical it would be advisable to compare the relevant portion of the axial polar curve with the three theoretical curves to ascertain the nearest approximation. The tables are evaluated in half-degree steps of angle and their arrangement makes for easy interpolation if it is required.

The error in treating closely-spaced sources in a row as a single length source will be under 10 per cent if the gap between the luminous parts of adjacent sources does not exceed $h/4 \cos\theta$, and the percentage error in any particular case is given by:

$$100\left[1-\frac{n\times l_1}{l}\times\frac{\text{sum of aspect factors for separate units}}{\text{aspect factor as a single source}}\right] \quad (3)$$

l_1 here = length of one unit in the row.

An example of this estimation will be found in the earlier article.[4]

Practical examples

Taking, for comparison, the three cases worked out by Bellchambers[3] on the sector flux system[2], the estimation by the aspect factor method would be as follows, using the data given in fig. 5.

A 5 ft fluorescent unit with an intermediate axial distribution is mounted 6 ft above a working plane and its transverse candlepower is 760, 880 and 830 candelas respectively in the planes at 47° 18′, 0° and 30° respectively which pass through points of interest 1, 2 and 3. Since the plane of interest is horizontal $\phi = \theta$ and so $\cos\theta \times \cos\phi$ becomes $\cos^2\theta$.

Point of interest no. 1. Since this point is opposite the middle of the unit the light contribution from one half will be estimated and doubled. The aspect angle α_2 to the end of the source (see fig. 6) is 16°; $\alpha_1 = 0$. Thus from the intermediate column of the table, the aspect factor of 0·27 is found corresponding to 16°, and the value of 0 for $\alpha_1 = 0$.

Therefore filling in quantities in equation (1) we have:

$E_1 = 2[1 \times 760 \times (0{\cdot}678)^2 \times 0{\cdot}27 \div (5 \times 6)$
$= 6{\cdot}29$ lm/ft²

The values by the sector flux method and by experiment were 6·2 and 6·4 respectively, according to Bellchambers.[3]

Point of interest no. 2. For this position, $\alpha_2 = 22\frac{1}{2}°$ (see fig. 7) and the aspect factor is 0·368. Since $\theta = 0$, $\cos\theta$ and $\cos^2\theta$ both = 1.

Thus the illumination is given, again using equation (1) by:

$E_2 = 2[1 \times 880 \times 1 \times 0{\cdot}368 \div (5 \times 6)]$
$= 21{\cdot}6$ lm/ft²

The sector flux method and the practical

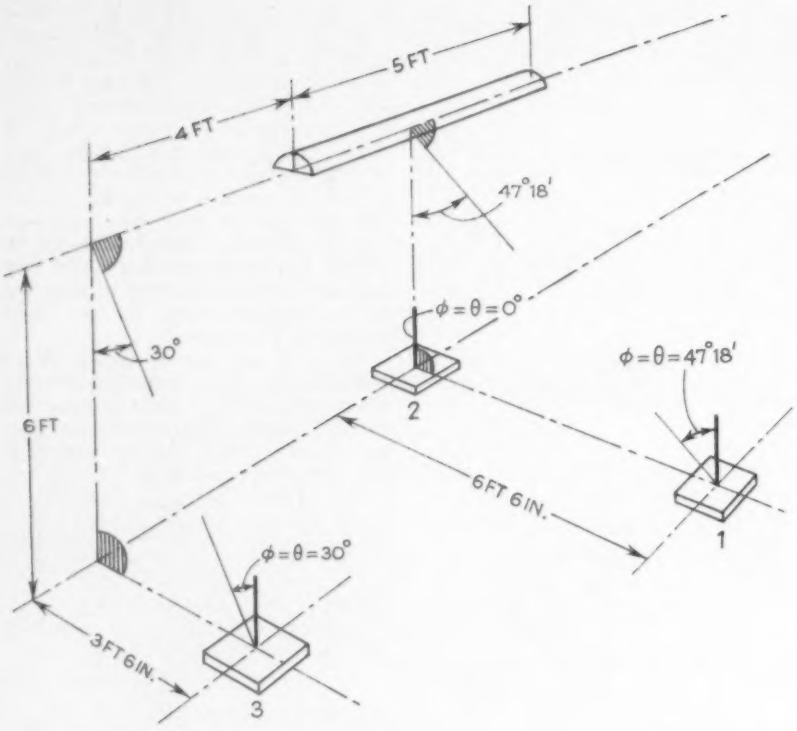

Fig. 5 (above). Three typical estimation problems.

Fig. 6 (below, left). Aspect angle diagram for example 1.

Fig. 7 (below, centre). Aspect angle diagram for example 2.

Fig. 8 (below, right). Aspect angle diagram for example 3.

measurement values were 21·5 and 22 lm/ft² respectively.

Point of interest no. 3. Here $\theta=30°$ and α_1 and α_2 are 30° and 52½° (see fig. 8) so that the aspect factor values for α_2 and α_1 are 0·663 and 0·479: their difference is 0·184.

Thus, substituting again in equation (1)

$E_3=[1\times830\times(0{\cdot}866)^2\times0{\cdot}184\div(5\times6)]$

$=3{\cdot}82$ lm/ft²

The values by the sector flux method and by measurement were given as 3·95 and 3·9 respectively.

Conclusion

The methods appear close in accuracy in relation to practical tests, and the aspect factor system may be of interest to those who prefer tables to graphs, and who find it convenient to use a formula suited to slide-rule and tabular operations.

Acknowledgments

The author wishes to thank Crompton Parkinson Ltd, by whose courtesy this article appears, and the *Electrical Journal* for permission to reproduce figs. 1 to 4.

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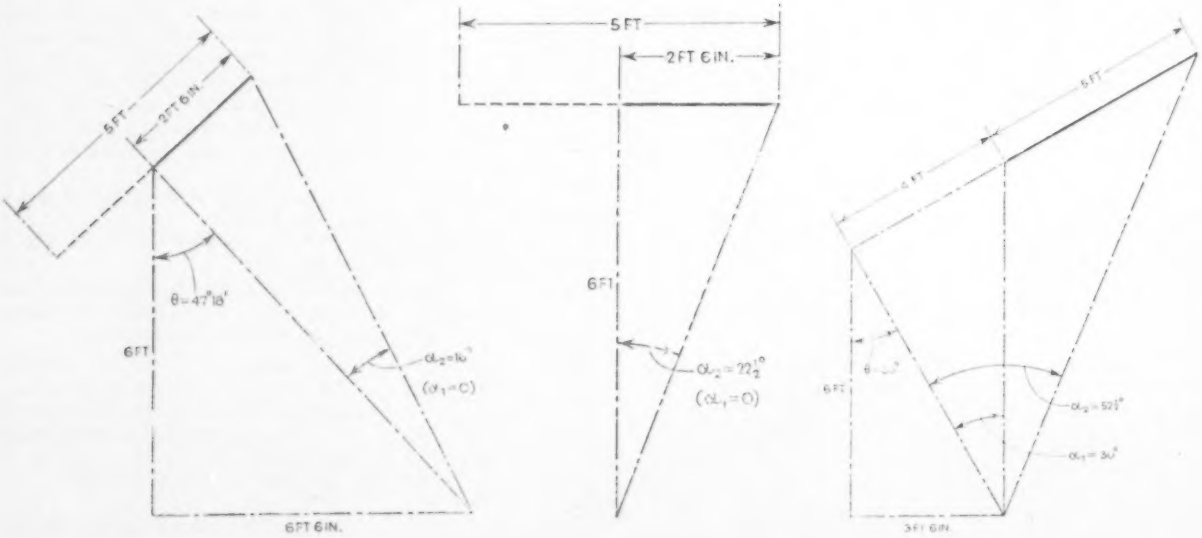

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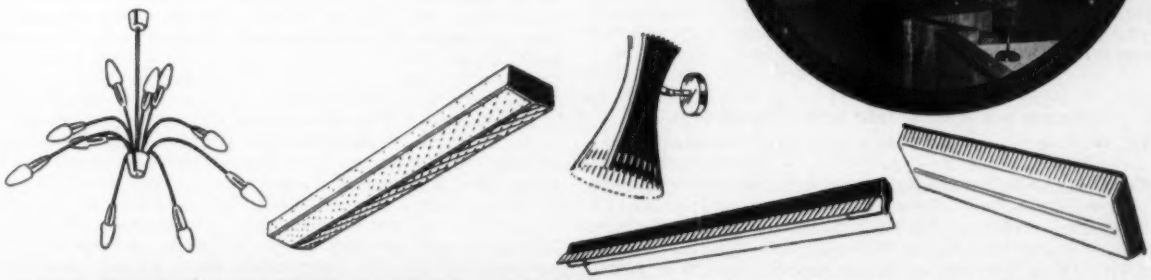

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LIGHTING ABSTRACTS

OPTICS AND PHOTOMETRY

942. A portable reflectance meter. 535.3

A. H. TAYLOR, *Illum. Engng.*, **55**, 614–615 (*November* 1960).

A portable reflectometer originally developed by the author in 1920 for visual measurements, using a Macbeth Illuminometer, has now been modified to operate from an emissive photocell. A filter is incorporated so that the instrument's response roughly corresponds to that of the 'average eye' to a source at 4,300°K (approximately to the U.S. standard 'cool-white' fluorescent lamp). The instrument is based on a 4-inch diameter integrating sphere and gives absolute values of diffuse reflectance for 45° incident light. P. P.

628.948

943. Lighting characteristics of grids formed of mirror reflectors.

D. FISCHER, *Lichttechnik*, **12**, 670–673 (*December* 1960). *In German.*

A grid is composed of two sets of mirror reflectors at right angles to each other. Each mirror is of V-section, but in one set the sides are plane, in the other set they are cylindrical paraboloids. The design is such that with fluorescent lamps mounted above and close to the grid and parallel to the second set of mirrors, the illumination below the fitting is very even over a range of some 35° from the vertical, while the luminance at all angles less than 30° from the horizontal is small. J. W. T. W.

535.241

944. Relation between luminous intensity distribution and limiting distance in photometry.

H. J. HENTSCHEL, *Lichttechnik*, **12**, 673–674 (*December* 1960). *In German.*

Expressions are derived for the error in a photometric measurement made at a given distance (*a*) from a large source with a small receptor, (*b*) from a small source using a large receptor and (*c*) in the general case. The intensity distributions considered are those for which $I_\theta = I_0 \cos^n \theta$, where n may have any integral value from -2 (wide distribution) to $+4$ (narrow). The commonly used rule that the distance should not be less than ten times the maximum dimension of the source (or receptor) keeps the error within 1 per cent. J. W. T. W.

945. Measurement of diffusing power. 535.36

J. KROCHMANN, *Lichttechnik*, **13**, 16–19 (*January* 1961). *In German.*

Various definitions of the diffusing power of a translucent material have been used and the author examines the relations between them. He then goes on to describe the method given in the German standard DIN 53490 for measuring the light diffused after transmission when the incident light is a beam normal to a plate of the material and he proposes certain modifications. Apart from criteria of diffusion which depend on measurements of the light transmitted by a material (*a*) diffusely and (*b*) without diffusion, there are such criteria as 'obscuring power' (converse of 'see-through') and haze; materials may receive very different relative ratings according to the criterion applied. J. W. T. W.

612.843.36

946. Concerning a universally valid scale of luminosity.

H. W. BODMANN, *Lichttechnik*, **13**, 19–21 (*January* 1961). *In German.*

The relation between luminosity (sensation of brightness) and luminance has been expressed by $H = B/(B+B_A)$ where B is the luminance of the test object and B_A the luminance adaptation level. This relation leads to the Weber-Fechner 'law', ΔH varying as $\Delta B/B$ so long as B and B_A are not very different. When, however, B_A is very large or very small compared with B, ΔH varies comparatively slowly: either as $\Delta B/B_A$ or as $\Delta B/B^2$ respectively. This explains why contrast sensitivity is greatest when the luminance of the test object does not differ greatly from that of its surrounds. Other conclusions of importance in lighting design are drawn by the author. In particular he considers the effect on contrast sensitivity of scanning a field with a range of luminance values. J. W. T. W.

LAMPS AND FITTINGS

947. New two-level lamp for residential application. 621.326

G. J. EDWARDS and M. E. WEBBER, *Illum. Engng.*, **55**, 618–624 (*November* 1960).

A common user complaint with conventional multiple-filament, multiple-light-level lamps for domestic use is that one of the filaments fails too soon in the life of the lamp, so restricting its versatility. This has been overcome in a new multiple-filament lamp in which the high and low wattage filaments are connected in series rather than in parallel, the lamp being arranged to operate from the same sockets and switches as the old type. The ratio of light output at the high and low levels is greater than before while the high-level efficiency is improved by 14 to 20 per cent. P. P.

621.327.534.15

948. The development of luminescent powders and its influence on the quality of fluorescent tubes.

G. GÜNTHER, *Ljuskultur*, **32**, 177–185 (No. 4, 1960). *In Swedish.*

The development of luminescent powders and their deposition on the walls of fluorescent tubes is discussed in detail. The effect of the thickness of the powder layer and of the grain size on the eventual luminous efficiency of the lamp is shown, and the properties of different forms of luminescent powder are evaluated. One of the bigger problems is to suppress the blue-violet line of the basic mercury spectrum. Unless this is done, materials, like butter, which absorb blue but reflect yellow-green, become unpleasantly greenish in appearance. The 'de-luxe' types of lamp employ an additive of red-emitting magnesium fluorgermanate or arsenate, but for the best colour-rendering a mixture of light from two or three different 'de-luxe' type lamps is best. R. G. H.

621.327

949. Forerunners and early history of the discharge lamp.

W. GURSKI, *Lichttechnik*, **12**, 663–668 (*December* 1960). *In German.*

A history of the evolution and development of the discharge lamp, starting with the first mercury vapour lamp described by Arons in 1892, continuing with the Moore and Cooper-Hewitt lamps, the Moore nitrogen discharge lamp and others leading to the neon and argon lamps patented by Claude 1908. The author gives a diagram showing the comparative costs in 1909 of obtaining light by means of the different lamps then available, although he cautions that the data are frequently liable to some uncertainty. The paper is well documented. J. W. T. W.

621.327.43

950. Colour and colour rendering of fluorescent lamps as related to the physical properties of the phosphors.

H. RUFFLER, *Lichttechnik*, **12**, 669–670 (*December* 1960). *In German.*

Describes the effect of temperature on the spectral distribution of the light given by different phosphors. In all cases the emission band is widened by raising the temperature. The position of the band in the spectrum may be shifted and the form of the spectral distribution curve may be altered, especially where this has more than one peak. The temperature change investigated is from −175°C. to 200°C. J. W. T. W.

951. Lighting fittings design. 621.329

J. MELLANBY, *Elect. Times*, **138**, 1003–1006 (No. 26, 1960).

In an article concerned largely with the facilities provided in modern tungsten fittings for fixing and making electrical connections, the author shows that some designers appear to have ignored the requirements of the electrical engineer and the IEE wiring regulation concerned with enclosure of cable ends. The fixing of ceiling-suspended fittings is seen to be less difficult than wall-mounted fittings, the latter exhibiting a greater tendency to variations from 'standard', which also applies to fittings of European make. The effects of the new small envelope lamps are also discussed, and the consequential changes in lampholder design; some methods of lampholder mounting, cable entry, and providing ventilation, are criticized. L. L.

952. Theme in lighting design. 621.329:628,973

P. T. RODD, *Elect. Times*, **139**, 167–169 (No. 5, 1961).

Proceeding from a justification for the use of fluorescent lighting in the home (and brief indication of its growing popularity), the writer discusses factors which influenced the design of a new range of domestic fluorescent fittings, in which the aim has been to achieve a number of harmoniously related units, simple in shape and character, and unobtrusive in use. The range has six basic units, three giving indirect or semi-direct lighting, the others giving direct lighting with diffusers, but it has been augmented by the inclusion of existing decorative tungsten fittings. L. L.

953. Trends in technology. 621.329

J. G. HOLMES, *Public Lighting*, **25**, 266–270 (*December* 1960).

Traces the trend of development in the various lamps and points to the fact that with certain developments of more compact overall size there has already been set up problems of insulation and the effect of overheating on contacts. The paper deals comprehensively with materials now in common use for reflectors and refractors and with the trend of lantern design generally. It suggests that as there is now only a small number of preferred lamps it should not be difficult to find a performance level for all similar lanterns. That well-designed lanterns with proved reliability, ease of maintenance and subsequent long life are the best investment even if the first cost is more than others. Suggests that it may be that the trend of developments in road design, reflectorized surfaces on signs, kerbs and white lines, with the possible improvement in car headlights, the demands made on street lighting installations generally may be somewhat modified. B. C. O.

954. Current applications of electroluminescence. 621.327

P. W. RANBY and P. J. CLEWER, *Trans. Illum. Engng. Soc. (London)*, **25**, 167–176 (No. 4, 1960).

Electroluminescent materials are briefly referred to, and the different forms of construction, and consequent performance, of ceramic and organic electroluminescent lamps are described. Ceramic-type lamps have applications where a surface is to be lit to a low luminance over a long life, while organic-type lamps are used in the construction of digital indicators. Electroluminescent lamps can be controlled by photoconductive cells, resulting in image converters and intensifiers, such as for X-rays. Certain electroluminescent lamps having manganese-activated sulphide phosphors can be operated from d.c. as well as a.c., the change in supply effecting a change in the lamp colour. P. P.

LIGHTING

955. Some aspects of lighting in the iron and steel industry.

D. R. M. NESBIT, *Journ. Iron Steel Inst.*, **196** (part 2), 207–212 (*October* 1960).

One of the peculiarities of the iron and steel industry is that in many working areas there is a qualified exemption from statutory requirements, so that the standards have to be decided by the lighting engineer, taking into account experience, past practice, environment, safety and cost. These factors are considered in the article, a detailed example being given of an open-hearth melting shop lighted by various types of source to show that 1,000 w colour-corrected fluorescent-bulb lamps operating at 440 v are by far the least expensive light source. Whilst the use of this lamp is also preferred on grounds of colour, it is thought there is greater likelihood of electric shock at this voltage. The article concludes with a closely argued case against allowing too high a maintenance factor, showing preference for providing adequate maintenance but points out some of the difficulties operating against a planned relamping scheme in the work areas considered. L. L.

956. Lighting—Keyed to today's homes. 628.972

ANON, *Illum. Engng.*, **55**, 594–613 (*November* 1960).

This second instalment of a three-part report on home lighting (see Abstract No. 926) deals with ceiling and wall fixtures, portable lamps and lighting for decorative accent. The newer fixtures are in a better scale and proportion to today's domestic interiors. Table and floor lamps require proper positioning. The appearance of pictures, sculpture, china cabinets and indoor plants is considerably enhanced by skilful lighting. P. P.

957. Viewpoints on the development of lighting. 628.972

I. FOLCKER, *Ljuskultur*, **32**, 165–167 (No. 4, 1960). *In Swedish.*

The fundamental requirements of artificial lighting are (*a*) an adequate supply of electrical energy, (*b*) a good power distribution system, (*c*) efficient and acceptable light sources, and (*d*) a range of lighting fittings adaptable to a wide variety of circumstances. Under present day conditions in Sweden these requirements are largely satisfied. Glare was, until recently, the 'serpent in the lighting paradise', but by paying proper attention to the subjective factors of human vision it is now possible to obtain glare-free lighting of the right level on the right place and of suitable colour. R. G. H.

958. Modules, light, sound and air.

G. NILSSON, *Ljuskultur*, **32**, 186–189 (No. 4, 1960). *In Swedish.*

Ventilation, sound absorption, and lighting of a new drawing office have been integrated into the modular ceiling design. Parallel lines of fluoresecent tubes behind crated polystyrene louvers have the lamps staggered so that there are no breaks in the line of light. The office, of area 380 by 60 ft, is illuminated by 4,000 40w and 1,200 80w warm white tubes, giving an average illumination which can be varied from 30 to 80 lm/ft². R. G. H.

959. Fifty years of development in the lighting of Swedish trains.

F. RIDAL, *Ljuskultur*, **32**, 192/204 (No. 4, 1960). *In Swedish.*

A comprehensive survey, dealing with methods of supply and control as well as lighting engineering. Since 1947 a level of 4 lm/ft² has been considered a suitable level of illumination for passenger compartments, but in the newer trains a level of 20 lm/ft² is provided with fluorescent tubes, together with additional reading lamps for every passenger. Transistors are used for conversion from 24v d.c. to a.c. at 220v, 400 c/s. R. G. H.

960. Presidential address. 628.971.6

F. C. SMITH, *Public Lighting*, **25**, 224–230 (*December* 1960).

This address to the 1960 Conference of the Association of Public Lighting Engineers sets out the theme of the conference—'The Changing Scene'. It traces historically the various phases of legislation, government reports and codes of practice which have influenced street lighting generally and deals with aesthetic values necessary to avoid vulgarity and bad taste. Valuable information as to costs and comments on the inequality of burden placed on local authorities through lack of monetary grants from a central source. Ministry of Transport tables of traffic densities and road casualties over a six-year period are published. On roads where good street lighting has been provided, there is now evidence to show that a reduction of some 30 per cent in personal injury accidents at night can be accepted compared with the injury rate before such provision. B. C. O.

961. An engineer surveys the changing scene. 628.971.6

C. HARPER, *Public Lighting*, **25**, 232–238 (*December* 1960).

Gives a survey of improvements in highway engineering in the Barking area from 1924 onwards and the consequent street lighting installations necessary. Similarly, highway and other improvements are described in other parts of this country and on the Continent. B. C. O.

962. Some recent developments in light control. 621.329

R. W. STEVENS, *Trans. Illum. Engng. Soc. (London)*, **25**, 149–162 (No. 4, 1960).

After considering the basic principles involved in light control, recent developments in such control by refraction, diffusion and reflection, and their influence on fittings design, are discussed. The introduction of acrylic and other plastic materials has considerably widened the scope for control by refraction and diffusion. Improvements in reflector materials are referred to. Specular reflectors are used to give a controlled cut-off with fluorescent lamps and to produce sources of extremely high intensity using low-wattage incandescent lamps. A distributed light control system is described whereby an array of ring diffusers are arranged to intercept a parallel light beam and extract the light at intervals along its length. P. P.

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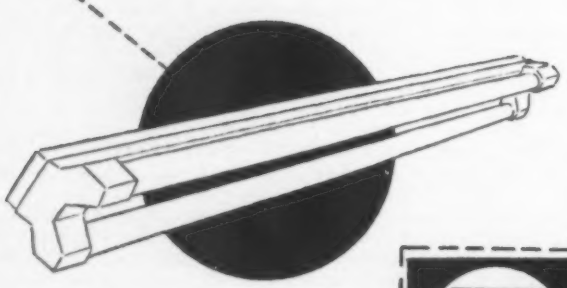

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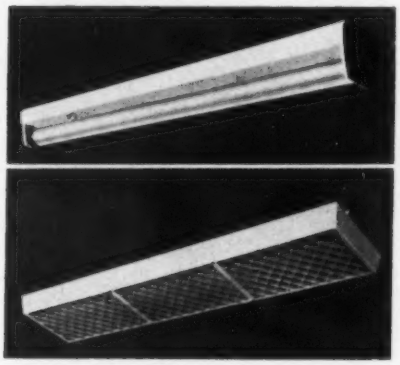
NEW PRODUCTS

Packaged lighting

THERE IS NO DOUBT that 'families' of lighting fittings based on a few standard items and various attachments have been of considerable value to users. Crompton, one of the first firms to introduce this idea, have now extended it by introducing a range of 'packs' of basic fittings of simple design and supplied complete with lamp to which may be added reflectors, diffusers or



other attachments to produce more sophisticated versions. These 'Crompacks' are made in 8 ft, 5 ft and 4 ft sizes; the fitting comprises a full-length backplate with integral lampholders (and capable, it is stated, of single-handed installation) together with a body which, after being locked open for wiring is simply attached to the backplate by screws engaging in keyhole slots. All attachments are fitted direct to the channel. Prices range from £3 14*s* 5*d* to £7 6*s*, including tax.
Crompton Parkinson Ltd, Crompton House, Aldwych, London, WC2.

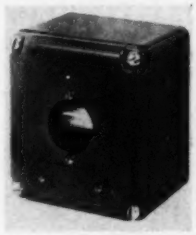
Modified ceiling trunking

THE ADAPTABILITY OF Unistrut channel originally designed as simple supporting system capable of wide application but later adapted for use as cable trunking—has been further extended by fitting 1 in. flanges on either side of the basic channel. This development has had its first application in Gas Board premises at Fulham, where it is used to support a modular suspended ceiling as well as acting as a trunking for the wiring and as a support for the fluorescent fittings used in the building. The ceiling panels may be laid on top of the flanges or bolted to their undersides, as required. The flanged channelling is in turn supported from short lengths of the basic channel clamped to the structural concrete beams of the building, thereby giving dual flexibility to the electrical layout. As those who have used it will testify, 'Unistrut' is extremely adaptable in application, by virtue of its construction. The channel has turned-in lips into which are fitted self-locating nut and bolt assemblies suitable for carrying a wide variety of attachments; the design is such as to permit the nut and bolt assembly to be placed at any position along the channel. A closer strip is then fitted to cover in the remainder of the channel. The use of the material for wiring has also been extended by the recent addition of two-way, three-way and four-way trunking junction boxes.
Sankey-Sheldon Ltd, 43-45 *Broadwater Road, Welwyn Garden City, Herts.*

Photoelectric control of lighting

IT IS GENERALLY RECOGNIZED that automatic control of artificial lighting results in the most economic operation of the installation, avoiding the random switching of individual points and resulting likelihood of their being left on at all times, irrespective of the illumination conditions. A neat and unobtrusive controller which has

Left, the basic 'Crompack' fitting together with the louver frame attachment.



Right, the new photoelectric lighting controller from Electrical Distributors.

recently become available for this purpose provides facilities for adjustment to a range of daylight levels. The unit is suitable for use with street lighting, in shops, factories, offices, hotels and hospitals and with safety lights and signs. The retail price is 7 gns.
Electrical Distributors, 11 *King Edward Buildings, Bury Old Road, Manchester,* 8.

Reducing street lighting glare

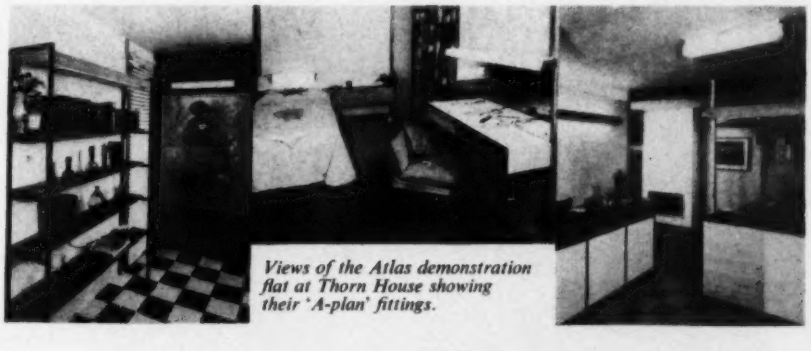
TO REDUCE GLARE without significantly diminishing illumination, open-type post-top and pendant lanterns in Liverpool and district have recently been fitted with a translucent eye-screen moulded specially for this use by Hygiene Plastics Ltd in 'Ridigex' high-density polythene. The screen is a hollow cylinder of 11 in. diameter with

One of the post-top lanterns in the Liverpool area fitted with eye-screens.

an inclined flange which enables it to be held in place by three retaining screws, or by spring-steel clips, depending on the type of fitting.
British Resin Products Ltd, Devonshire House, Piccadilly, London, W1.

Domestic fluorescent lighting

DOMESTIC LIGHTING SEEMS NOWADAYS TO have been somewhat neglected, in favour of more rewarding enterprise in other fields of illuminating engineering. Perhaps, however, a Cinderella-like return to prominence is indicated, foreshadowed in the serious attempt by Atlas to promote the general use of fluorescent lighting in the home, following the success of their 'Kitchen-light'. The attempt finds expression in a range of fittings designed primarily for domestic use and which therefore have the pleasing attribute of being domestic in scale and character. There are six basic units in this 'A-Plan' series; three are new metal reflector fittings and three are new diffuser units making use of their 'Popular Pack' channel. The reflector fittings consist essentially of no more than a slim metal channel housing lamp and control gear. The versions differ in the width of one or both sides, in the addition of a front plate and in the use of slot perforations to make them suitable for ceiling or wall mounting with upward/downward lighting or downward lighting only. The three diffusers are reeded 'Perspex', angle-shaped opal 'Perspex' and resin-coated patterned fabric. Some uses of the fittings are indicated in a demonstration flat Atlas have specially created at their showrooms.
Atlas Lighting Ltd, Thorn House, Upper St Martin's Lane, London, WC2.



Views of the Atlas demonstration flat at Thorn House showing their 'A-plan' fittings.

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IES Activities

IN THE NEW YEAR, Birmingham had a highly successful event in its display of lighting equipment. Exhibitors may show up to four lighting fittings developed during the past two years and not previously shown at this biennial event, and address the meeting on the merits of their display for four minutes, the meeting then being open for general discussion. Thereafter the audience may examine the display more closely and make their own personal enquiries. The display was held on January 2, at the Bennett Hall, YMCA, Birmingham, and brought twelve of the leading manufacturers of lighting equipment together to show their latest ideas. Display stands were also allocated to the Society and to the Electric Lamp Industrial Council. Mr Eric Kemp, a past Chairman of the Centre and a most energetic campaigner for new members, had an excellent exhibit, spotlighting the activities of the Society in this country and abroad. He also addressed the audience on the merits of Society membership, and enlarged upon his talk with some captivating colour slides of floodlit architecture. The new lamps on view were most interesting, and whilst few manufacturers were exhibiting fittings to house them, they are undoubtedly considering their potentialities, and we shall see the results in future displays. This event, which grows in the number of participants and size of audience each time, is becoming a barometer to indicate development trends. Manufacturers are eager to secure an opportunity to display, and the discussion which follows, led on this occasion by Mr J. R. Anderson, is trenchantly objective and very much enjoyed by everyone present. It will undoubtedly continue to grow in importance, and already intending exhibitors are making enquiries about the display in two years' time.

FOLLOWING THIS SUCCESSFUL VENTURE, Birmingham Centre had an enjoyable meeting at the end of January at which Dr R. G. Hopkinson presented a paper on visual perception. He started by explaining the vital interdependence of the receptive organ (the eye) and the interpretive organ (the cranial visual centres), to show that only the two working in harmony constitute vision. As an example, he cited the situation of a person born blind as a result of injury to the eye. Should that person later acquire the power of sight the interpretation of the visual image would be of a low order, because it would have no memory of previous visual experiences; as a result, the person would have to learn how to see. At first, this would constitute relating what is learnt by sight with what is learnt by touch; only later would it become possible to judge distances and interpret the meaning of images of objects too far away to be touched. Interpretation of visual information is one of the links between lighting and vision; it is possible by means of lighting to devise illusions to deceive the observer. Of more importance, however, is the situation where the lighting and its relation to the observer is inherent such as to make for deception. Studies of such situations have been made in practice by those concerned with visual errors made by aircraft pilots. In constrast, little work seems to have been done in connection with travel on land and now that it has become commonplace to travel at speeds of more than 80 m.p.h. on open roads, when there is so little time for action to correct errors, it is clear that we need to known when and why our eyes deceive us and to make sure that all possible help is given, especially at night, to prevent an optical illusion being the last thing we see.

DURING EARLY MAY, the Edinburgh, Glasgow and Newcastle-upon-Tyne Centres are planning a joint week-end meeting at Peebles for which an interesting programme of technical and social activities has been arranged. The week-end starts with a welcoming dinner on Friday evening, May 5, followed on Saturday morning by a technical session, for which the Centre has been fortunate in obtaining the services of Mr C. L. Crouch, the Technical Director of the American IES, who is to talk on lighting practice in the USA; Mr W. Robinson will also present a paper reviewing official lighting requirements in various fields. The afternoon has been set aside for an hour's discussion on the morning's papers, to be followed by a social programme for the remainder of the day and for Sunday morning.

A WARNING that lighting engineers should be keen observers of Continental developments in exterior lighting was given by Mr A. G. Penny in a paper read to the Sheffield Centre's January meeting; it seems that while British engineers have reached the stage of thinking about new ideas, Continental engineers are already putting them into practice. Mr Penny described the various approaches made to the problem of providing high intensity lighting in city centres and on main highways, explained the tendency towards particular light sources for particular applications and showed the growing use being made of the technique of lighting large areas from a few groups of lanterns mounted on high columns. He continued by discussing the greater use made on the continent of floodlighting as an art form without necessarily incurring heavy capital costs on the installation and concluded that whilst not all of the continental developments in exterior lighting were to be commended, there was much to be learnt in studying their experiments and evaluating the results. The discussion was opened by Mr Woodhouse, Sheffield's Public Lighting Engineer, and the vote of thanks proposed by Mr V. Loupart.

Dr W. S. Stiles, IES President, with Brig F. Jones, Chairman of the IEE South Midland Centre, Ald G. B. Boughton, Lord Mayor of Birmingham, and Mr B. J. McCarthy, Chairman of Birmingham Centre, the speakers at that Centre's Annual Dinner in January.

Forthcoming Events

LONDON

March 14

The calculation of illumination in practical lighting design; Predetermination of direct discomfort glare, by H. D. Einhorn. At the Federation of British Industries, 21 Tothill Street, SW1, 6 p.m.

CENTRES

March 1

EDINBURGH. 25 years of stage lighting, by F. P. Bentham. YMCA Social Room, 14 South St Andrew Street, 6.15 p.m.

NEWCASTLE-UPON-TYNE. Lighting and other things in Moscow and Leningrad, by A. G. Penny. Room B7, Percy Building, King's College, Queen Victoria Road, 6.15 p.m.

SWANSEA. Floodlighting. S Wales Electricity Board, The Kingsway, 6 p.m.

March 2

CARDIFF. Electricity in horticulture and farming, by G. J. Everett.

GLASGOW. 25 years of stage lighting, by F. P. Bentham; AGM. British Lighting Council, 29 St Vincent Place, C1, 6.30 p.m.

NOTTINGHAM. Presidential Address, by W. S. Stiles. Electricity Centre, Carrington Street, 6 p.m.

March 3

EDINBURGH. Supper Dance. Carlton Hotel.

NOTTINGHAM. Ladies' Evening. George Hotel.

March 4

MANCHESTER. Dinner Dance. Woodlands Hotel, Wellington Rd, Timperley, 6.30 p.m.

March 9

MANCHESTER. Blackpool illuminations, by H. Carpenter. Illuminations and Electrical Services Department, Rigby Road, Blackpool, 2.30 p.m.

March 10

BATH AND BRISTOL. Dinner Dance. Hawthorns Hotel, Bristol.

March 13

SHEFFIELD. The use of coloured light, by H. Hewitt. Grand Hotel, 6.30 p.m.

March 20

BATH AND BRISTOL. Symposium with architects. Gardiner, Sons and Co Showroom, Bristol.

LEEDS. The new IES code for lighting in buildings, by H. Hewitt. British Lighting Council, 24 Aire Street, 6.15 p.m.

March 21

LIVERPOOL. Characteristics and applications of photoelectric cells, by F. A. Benson. Merseyside and N Wales Electricity Board, Paradise Street, 6 p.m.

NORTH LANCS. AGM; Colour measurement in industry, by W. Harrison.

March 27

BIRMINGHAM. Hospital and operating theatre lighting, by S. Hubbold. Regent House, St Phillip's Place, Colmore Row, 6 p.m.

LEICESTER. An electrical engineer in local government service, by D. L. Richards and A. E. Griffiths. E Midlands Electricity Board, Charles Street, 6.15 p.m.

MISCELLANY

Book Review

'Science in Industry—Policy for Progress' by C. F. Carter and B. R. Williams; published by Oxford University Press, London, 1959. Pp. 186, price 21s.

This book should be read by all scientists having any executive responsibility in industry and by all industrialists who make use (or should make use) of science. It is the third of a series of reports prepared for the Science and Industry Committee dealing with the application of scientific ideas in British industry. There are two parts, the first concerned with 'Action by Industry'; the second, 'Action by Government'. The second part gives us the opportunity of blaming 'them', but after reading the first part most of us—if honest—will criticize ourselves first. This is no guide to efficiency in sixteen easy chapters but a well-reasoned analysis which should stimulate everyone interested in 'the use of science to create new or better products and processes'. W.R.S.

Personal

Changes announced recently in the Board of the GEC include the appointment of Mr T. B. O. KERR as deputy managing director; he had previously been director for finance and administration and secretary. The financial director is now Mr E. H. DAVISON, who comes to them from Courtaulds Ltd where he was treasurer. Further appointments are to be made later to strengthen the board further. A management committee has also been formed, consisting of Mr Arnold Lindley (GEC Chairman), Mr Kerr, Mr Davison, Mr O. W. Humphreys (director for research and technical development) and Mr R. N. Millar (managing director of the GEC's Engineering Group).

The Council of Industrial Design has appointed Mr J. S. COUSINS to the new post of purchasing liaison officer. Mr Cousins, previously with Sir Basil Spence and Partners, will be concerned with the design policy of corporate buyers, such as industrial organizations, government departments, the services, transport undertakings, hotels, educational institutions and hospitals, with the aim of encouraging such purchasers to give a constructive design lead in their choice of interior furnishings and equipment.

Two new appointments are announced by Philips Electrical Ltd for their south-east region. Mr H. D. NORRIS has joined the company as lighting engineer; Mr M. H. BILLETT has been appointed representative for the firm's Lamp and Lighting Group in west and north-west London.

Mr J. S. CLEMO has been appointed to the Board of The Benjamin Electric Ltd. Mr Clemo has been the company's chief accountant since 1932 and continues in that position.

New advertising manager of the GEC's Lighting and Heating Group is Mr G. COLE, previously advertising manager of Atlas Lighting Ltd. Mr Cole has qualified as an associate member of the Institute of Practitioners in Advertising and as a member of the Advertising Association and is also a member of the IES Publicity Committee.

Atlas Lighting Ltd have appointed Mr A. ROWLETT as their area manager for Scotland. He was previously Scottish sales supervisor.

Overseas News

WESTINGHOUSE ANNOUNCE that they are augmenting their new range of high-efficiency fluorescent lamps with four additional sizes—two new 'slimline' lamps, of 48 in. and 72 in., to be used in commercial and industrial installations individually or in combination with the existing 96 in. 'slimline' high-efficiency lamp; a 40w T17, instant start lamp primarily intended for use in schools and a 5 ft, 90w T17 lamp. These high-efficiency lamps are stated to produce 15 per cent more light than 'cool white' lamps and 36 per cent more than 'Daylight' lamps, resulting from the use of a new phosphor combination.

FOLLOWING THE PLAN, announced in December last year, to merge the Wakefield Co, Vermilion, Ohio, with the Abrasive and Metal Products Co of Detroit, to form a new Wakefield Corporation, the Abrasive and Metal Products Co has announced that it is purchasing the Art Metal Co, which firm has been engaged for 37 years in the manufacture of commercial and domestic filament lighting fittings. The new Wakefield Corporation will therefore have an impressive electrical and lighting group: Art Metal; Sta-Warm Electric Co, an Abrasive subsidiary; Wakefield Lighting Ltd, the Canadian subsidiary; and Wakefield Southwest Co. Wakefield have been involved in lighting for 55 years, having started by making gas fittings; they played a leading role in the development of luminous ceilings, and, more recently, high-frequency high-voltage systems for office lighting.

British Standards

B.S.2818: Part 2: 1961, *Specification for auxiliaries for operation of fluorescent lamps on a.c. 50 c/s supplies; Part 2: Capacitors, 6s.*

Whereas the previous edition of Part 2 of this standard was concerned only with

capacitors for 80w lamps operating in switch-start circuits, this new edition extends the scope to apply to capacitors operating in circuit with all types of lamp complying with B.S.1853, *Tubular fluorescent lamps for general lighting service*. It sets a higher standard of quality and therefore requires capacitors to be marked with the year, as well as the number, of the standard. Test requirements have been changed; one of several new tests added is a sampling test to be applied to samples taken from batches of capacitors as they are manufactured. This new edition is published as a separate document, unlike its predecessor, which was issued under the same cover as part 1, which is, of course, still current in application.

B.S.354:1961, *Recommendations for photometric integrators*, 4*s*.

In this revision, the text has been amended to cover the testing of tubular lamps and recommendations relating to the accuracy of measurement have been included. The appendix, which contains formulae for suitable paints for the internal surface of an integrator, has been revised.

British Standards noted above may be obtained from the British Standards Institution (Sales Branch), 2 Park Street, London, W1, at the prices stated; postage is charged extra to non-subscribers.

Industrial Notes

TO EXPAND EXPORTS, the electrical industry s undertaking a new venture—co-operative exporting. At a meeting earlier this year, more than 130 export managers and senior executives of the industry agreed that the British Electrical and Allied Manufacturers' Association should make arrangements to put firms in touch with others making complementary equipment with a view to joint market research, sales efforts and collective exhibitions overseas. The first step will be the completion of a confidential questionnaire by each of the firms represented at the meeting. In replying to the questionnaire, firms will indicate the products they wish to export, the overseas territories in which they would like to co-operate, any existing overseas facilities they would be prepared to share and whether they would like to co-operate with firms in other industries. Several of the larger firms in the industry offered to provide help to smaller firms manufacturing complementary products by sharing their overseas facilities.

STIMULUS FOR EXPORTS has also come from another quarter with the news that a 57,000 ft² island site bounding Leicester Square is to be an exhibition centre for exports. Three floors are to be devoted to a mixed trades permanent exhibition at which retail purchases by overseas visitors will be accepted as well as wholesale orders; another three floors will be given over to weekly and two-weekly trade shows for wholesale buyers only. Stand space at the permanent exhibition is at rates from £1/100 ft/day. The promotion is a joint effort by Ideas Marketing Pool, Piccadilly Centre, Digby Smith International Travel and Icelandic Airlines, who are to offer special rates to overseas buyers visiting the centre.

TO COMPLETE A HAT-TRICK of export promotion projects, the Advertising Association have just issued a 30-page booklet which gives a blunt warning of the threat to the country's standard of living which a poor export record makes. Entitled 'A practical guide to the promotion of exports', it brings together the views of five experts under the guest editorship of Roger Falk, Chairman of the Marketing Development Co Ltd. It starts with an almost frightening analysis of the British export situation and goes on in the specialist contributions to show manufacturers what can be done in the way of market research, appointing agents, overseas sales promotion, packaging and making use of government services for successful exporting.

THE BRITISH LIGHTING COUNCIL indicate that the following lecture activities have been arranged for March:

2; Lighting in interior decoration, by R. L. C. Tate, for the Modern Institute of Design and Art Services, Grand Hotel, Manchester, 10.30 a.m.

2; Artificial lighting and interior design, by R. L. C. Tate, for Design and Industries Association, Grand Hotel, Manchester, 1 p.m.

6; Lighting conference for architects, Dundee.

7; All-day conference for industrial users, Leeds.*

7; Lighting conference for architects, Edinburgh.

7; Shop interiors, by L. Johnson, Technical College, Doncaster, 7.30 p.m.

14; Conference on lighting for work, Treforest, Glamorgan, 2.30 p.m.*

14; Conference on industrial lighting, Vain Arms Hotel, Stockton-on-Tees, 4 p.m.*

16; Afternoon conference on industrial lighting, Newcastle-upon-Tyne.*

21; Conference on industrial lighting, for works executives, Warrington.

An open invitation is extended to all electrical contractors and electricity board staff at meetings marked with an askerisk. For invitations to other meetings, and for further details of all meetings, those interested are asked to contact their nearest BLC Regional Engineer.

HIRD-BROWN LTD have been appointed sole agents in this country for National Semiconductors Ltd, a Canadian firm making photo-conductive cells of the cadmium sulphide type. These cells are stated to combine wide operating range with high sensitivity to light intensity changes; in power dissipation the cells vary from 0·3w to more than 2w.

INCREASED EFFICIENCIES and higher prices form the basis of two recent Atlas announcements. The greater efficiencies relate to their 'de luxe natural' fluorescent tubes; increases range from 11 to 17 per cent and result from the large scale production following rapid rise in demand. The price increase (of 7½ per cent) relates to certain industrial fittings for filament lamps.

Situations

Vacant

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It is regretted that, when given in our February issue, this advertisement inadvertently stated an incorrect salary.

Harris and Sheldon (Electrical) Ltd wish to appoint a LIGHTING FITTINGS DESIGNER for their Birmingham design office. This is an appointment involving the development of a wide range of standard and special fittings and applicants must have a minimum of five years' experience in this field. The Company's expansion programme ensures excellent opportunity for advancement for applicants with initiative and a flair for design. Written applications for an interview to: The Senior Designer, Harris and Sheldon (Electrical) Ltd, 31 Stafford Street, Birmingham, 4.

Harris and Sheldon (Electrical) Ltd wish to appoint a young DESIGNER aged 20/30 for their expanding London Office, Dip. MIES preferred. This interesting post will involve liaison with the sales force in the preparation of lighting schemes including the development of special lighting fittings to an outline stage and offers prospects of advancement to an applicant with a high standard of design experience. Write in confidence to the Sales Manager, Harris and Sheldon (Electrical) Ltd, 46 Great Marlborough Street, W1.

DRAUGHTSMAN, capable of carrying out working drawings from preliminary sketches, required by West End firm of Lighting Fittings, Designers and Manufacturers. Salary according to qualifications. Apply Box No. 723.

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Postscript

REPORTS ON TECHNICAL MATTERS in the general daily press lose, and sometimes gain, by the fact that they are written by laymen who must somehow get 'news value' out of dull material. There was recently a report announcing a conference on Vision in Industry organized by the British Safety Council and the North London Association of Ophthalmic Opticians. It was claimed that '40 per cent of Britain's industrial workers have poor eyesight, making them visually inefficient for their job'. If by 'poor' eyesight we mean eyesight *just* below normal, and by 'visual inefficiency' we mean *just* below average visual efficiency, then of course, by the simple laws of arithmetic, this statement must be true. Moreover, even if the North London opticians succeed in providing National Health spectacles to improve the vision of the unfortunate 40 per cent, it will still be true. What is more unfortunate, however, is the fact that there may be a significant proportion of visual inefficiency resulting from inadequate lighting. In other words, the optician's provision of proper visual aids, although important, has to be married to the illuminating engineer's provision of good lighting to obtain an effective reduction in the visual effort required by the worker in carrying out his work. Some years ago there was a determined effort to advance co-operation between the two professions and we often saw opticians at IES meetings. Perhaps the time has come for a renewed attempt to achieve co-ordination of common aims.

THIS IS CERTAINLY NOT THE DAY of the private inventor, and still less of the private research worker. It is becoming difficult enough for the worker with every facility at his command to keep up with everything that goes on in his subject, even in his own country. The private worker has either to spend much of his time in libraries or to work blind. On top of all this is the language barrier which is becoming increasingly felt now that Russian technology has so much to teach us. Until the days of the first sputnik most of us were content to make an occasional glance over our shoulders to see how far back the Russians were in the technological race, but now it is more a matter of frenzied sideways looks to see if they are really ahead or not. So far as one can tell from their technical literature their best work in lighting is less sophisticated than ours, but does not suffer for that because it often goes back to first principles to get the right answers, whereas some of our work reads as if the authors, through long familiarity through their subjects, were writing in their sleep. Endless refinement makes for stagnation rather than progress. The lesson that was read to the IES at Harrogate last year, that accuracy being chased for itself was no substitute for good common sense, needs to be rubbed in over and over again. These musings arise from a reading of an excellent little book on Automatic Translation which came my way a few weeks ago. It is by a Russian author, D. U. Panov, and published by Pergamon; despite its title, it has been translated by a human translator. It shows how electronic computers have revolutionized mechanical translation by making it possible to adopt any process which depends or can be made to depend on simple arithmetic operations; the length of the process is of secondary importance in view of the computer's high working speed. The arithmetic operation may be merely subtraction, which would be made possible by substituting numbers for words. In translating, say, from Russian to English, the computer would initially be made to store a series of numbers, representing an English-Russian dictionary in which each pair of equivalent words had been given an identifying number. The English text to be translated is then coded by giving each word therein its appropriate number. The translator then takes each number in turn and subtracts it successively from every number in the English section of the dictionary until a zero answer results. That then is the wanted word, whose Russian equivalent is found in the parallel Russian section of the dictionary. When we look up a word ourselves, we use a number of short cuts. If the word begins with T we turn straight to the T section and then search for the second, third and fourth letters until the complete word 'clicks' into place in front of our eyes. Since the computer works so fast, these short cuts, which involve some intelligence and experience, are unnecessary. Again, if the word has several meanings, we use our experience and fore-knowledge to deduce the right meaning. The computer, being quick but stupid, is made to try a very long series of alternatives rather like working through a bird identification book. For example, the meaning of a word often depends on the word or words preceding or following it, so that the computer is made to try this out in a pre-determined order. Grammar is handled by a similar testing procedure, which would be extremely tedious and time-consuming in human hands. The Russians, like many others, have built electronic machines which can prepare a passable translation of technical material; certainly the essential message can be got through, but shades of meaning and emphasis are often lost. Thus the sentence 'This is true certainly of the vast category of problems associated with force and motion' becomes 'This is undoubtedly true for a wide range of problems linked with force and motion'—a transmutation no worse than is perpetrated often enough by editorial panels of learned societies on papers submitted to them for publication.

LIGHTING, LIKE EVERYTHING ELSE, is now becoming a branch of electronic computing. That this stage has now been reached was made clear from the paper given by Mr Ruff and his colleagues to the IES early in the New Year. Several speakers mentioned the terror that the mere thought of an electronic computer strikes in their hearts, and Mr Ruff's demonstrations with flashing lights and clacking relays did nothing to allay their fears. I was very glad therefore when Mr Petherbridge spoke up boldly and pointed out that an electronic computer was nothing more than a mere adding machine, and a very simple adding machine at that, because all that it can do is to add 1 to 0 and take it away again. The marvel of the device lies more in the fact that it can do a great many of its simple sums extremely rapidly. The machines work only because somebody has the skill to break down a problem into a matter of adding and subtrating 1's and zeros and this really does need some good brainwork. But even some part of this 'programming' procedure can itself be systematized, so that computers are used to programme other computers. Have we started something else that we cannot stop?

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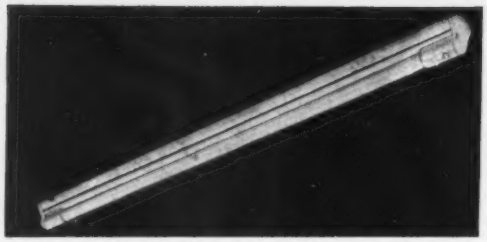

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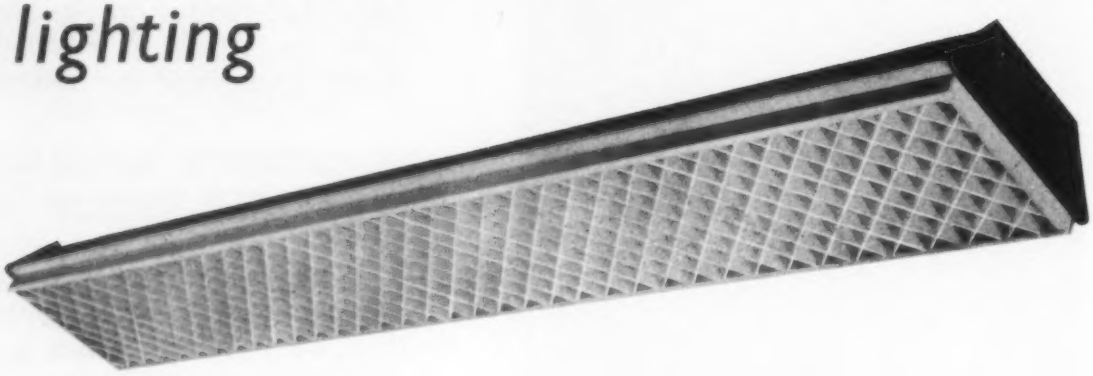

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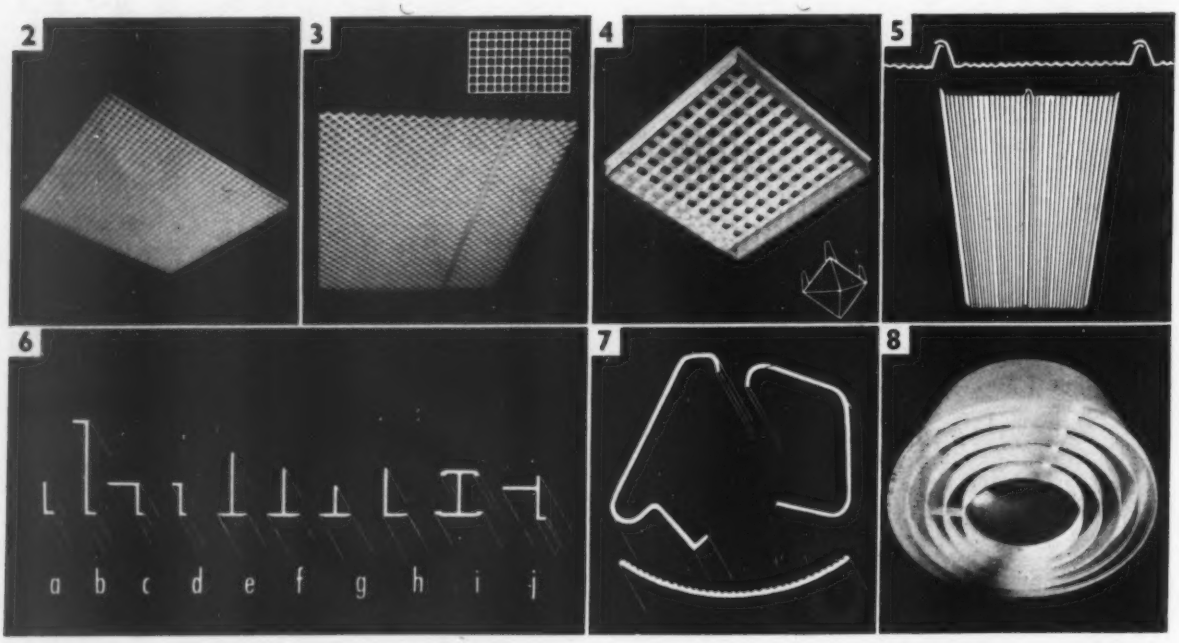

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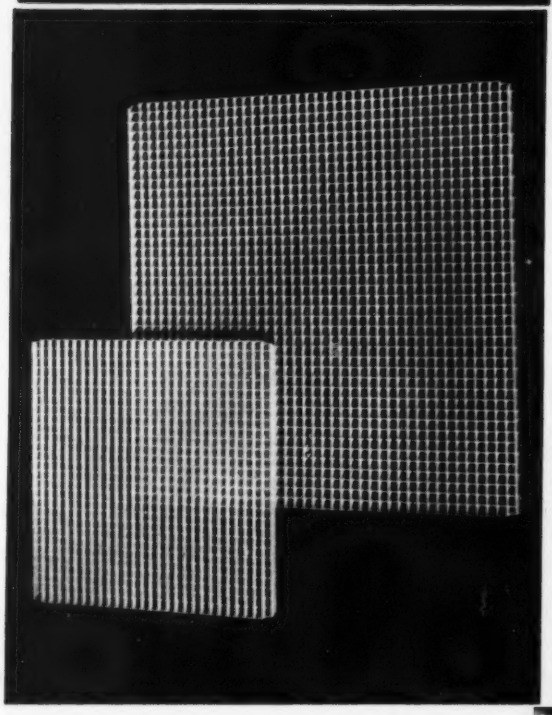

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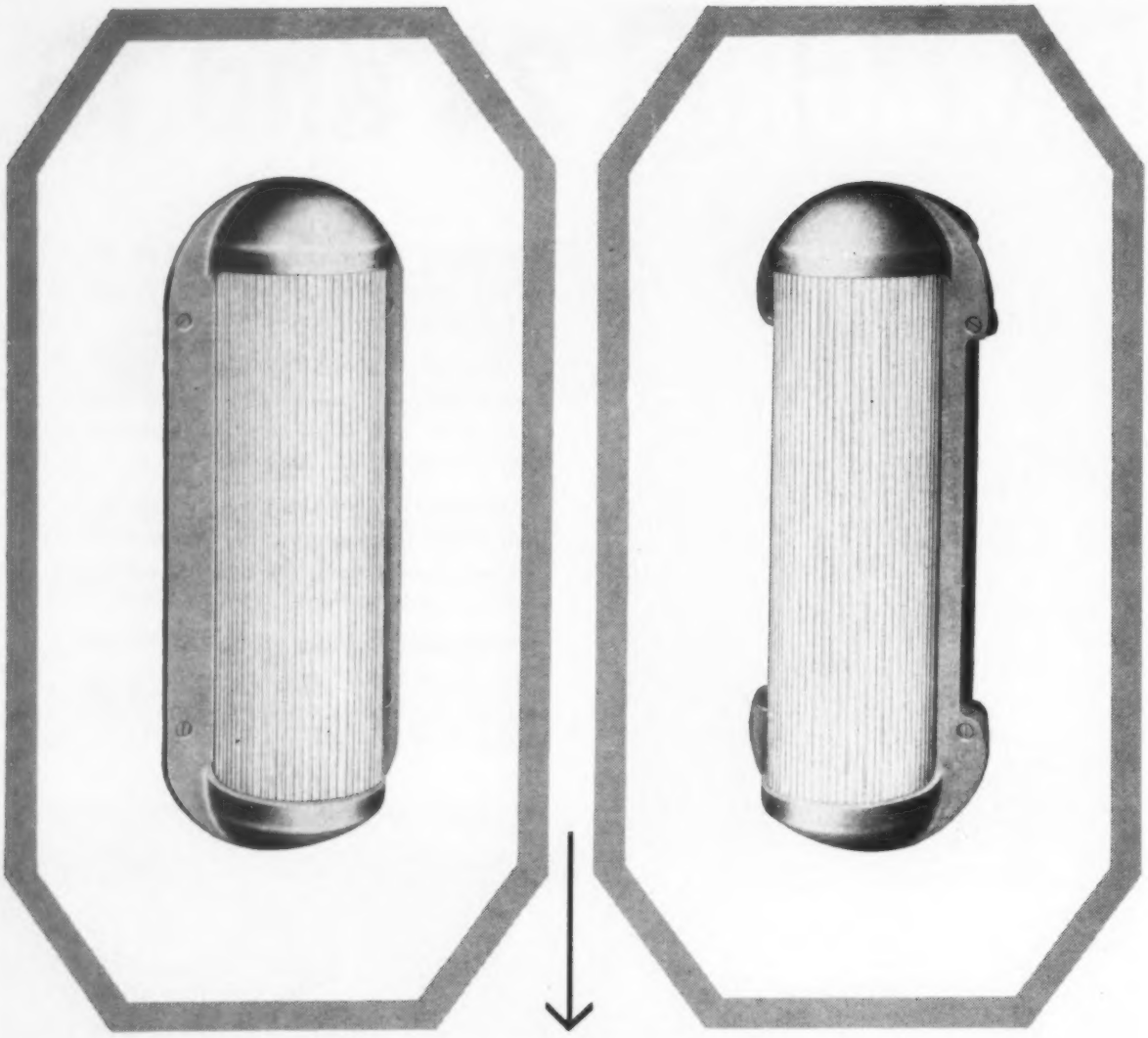

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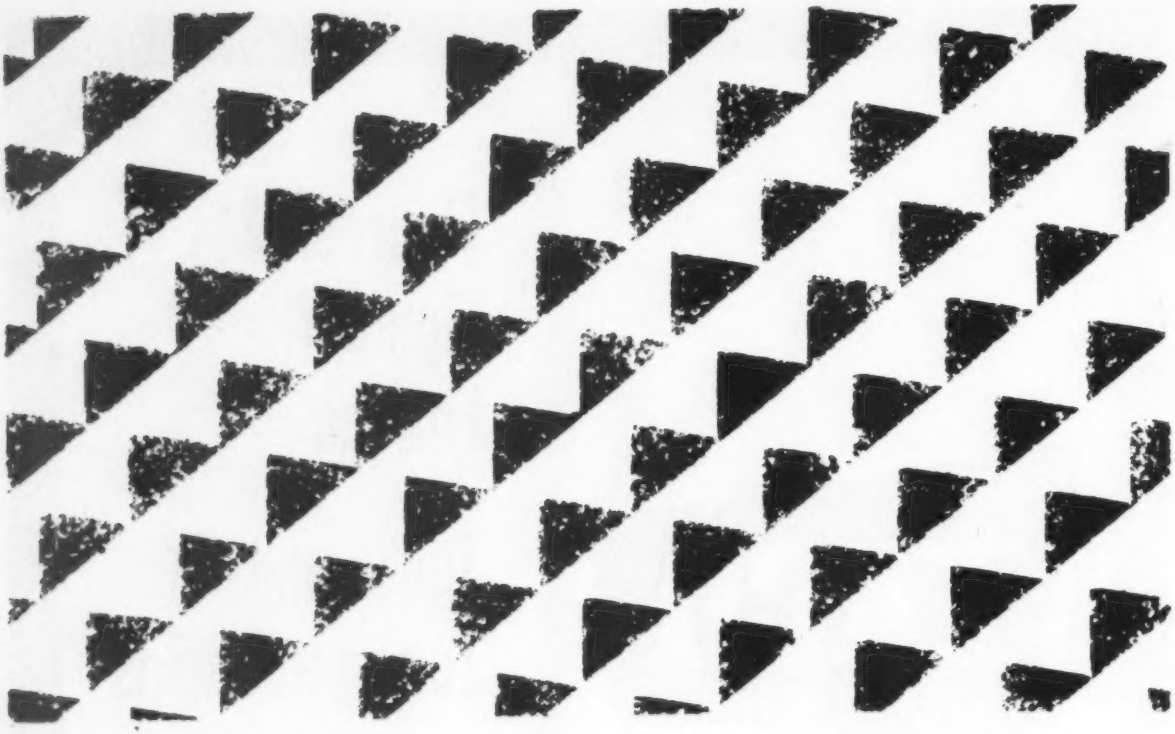

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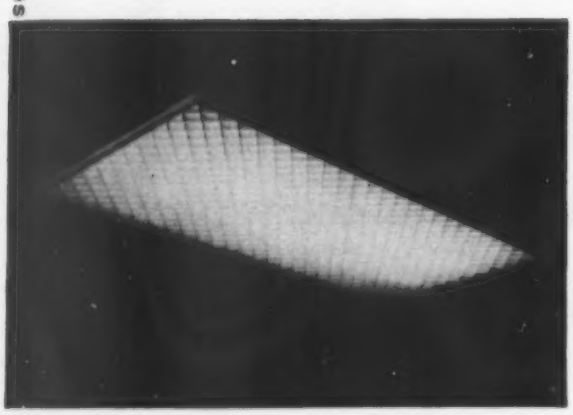

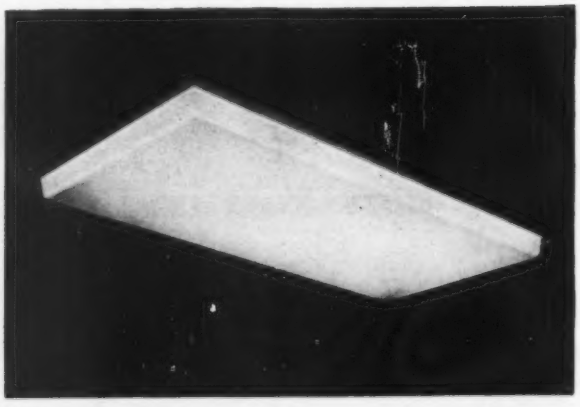

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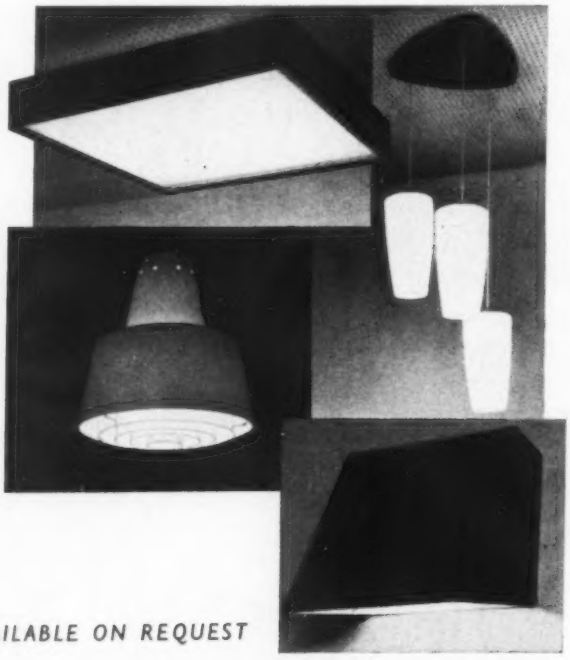

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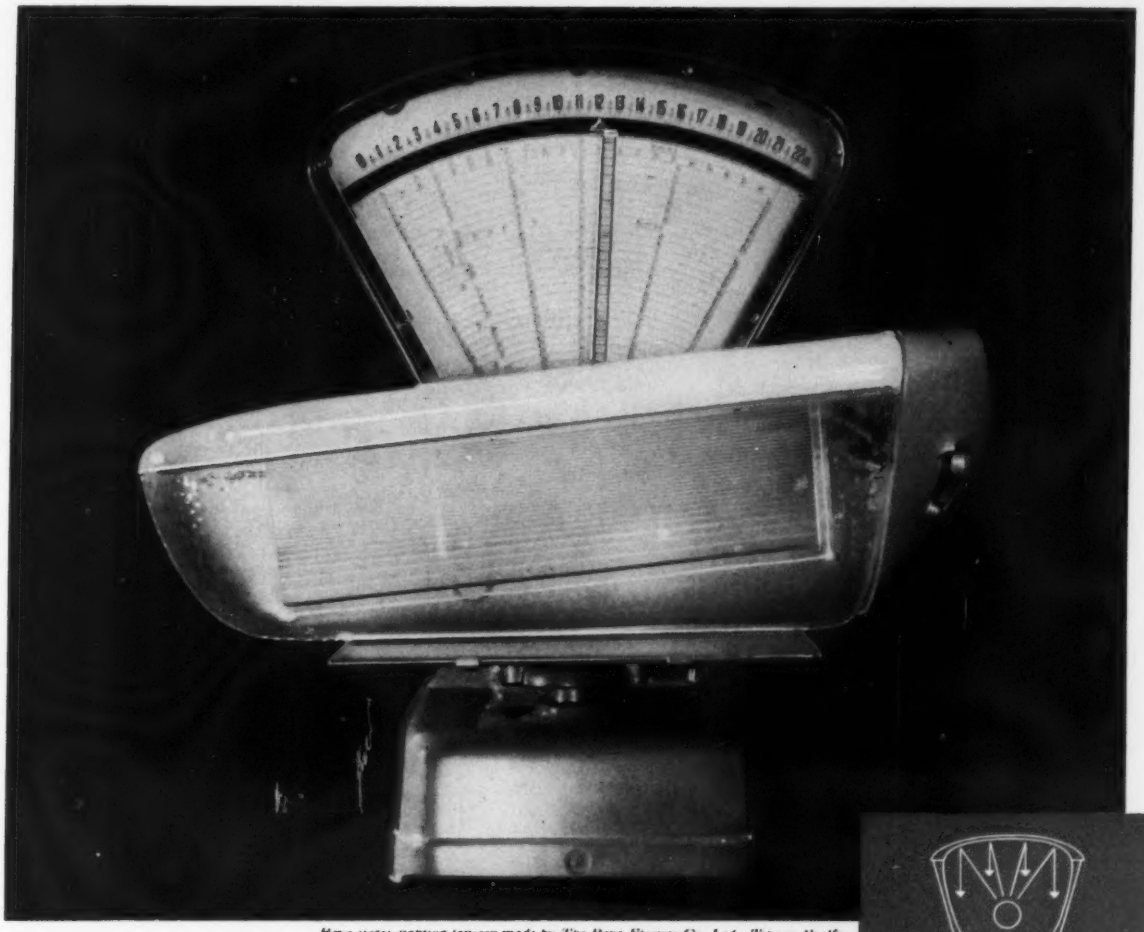

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'Perspex' gives light with lightness

THIS Revo street-lighting lantern weighs only 12 lbs, yet it is over two feet long. It is designed for use with 140-watt sodium lamps and both the bowl and the canopy are made from 'Perspex' acrylic sheet.

Clear 'Perspex' is used for the bowl, slightly patterned to obscure the fittings inside. On each side, areas have been left unpatterned and refractor plates cemented to them. The plates are machined from 'Perspex' and designed to give the most efficient light distribution.

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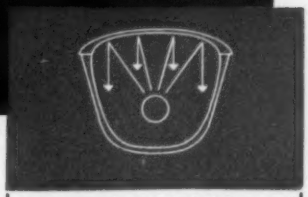

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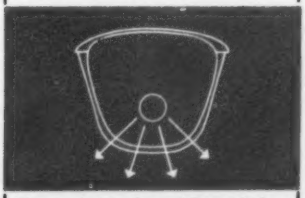
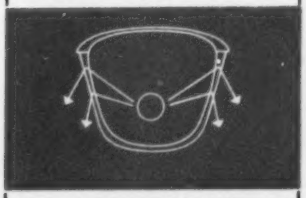


Transmission through base of clear 'Perspex' bowl — 90%.



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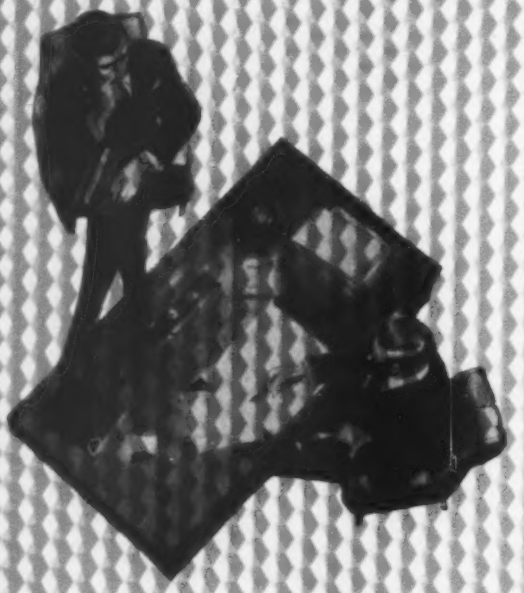

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